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THE PREWAR POPULATION OF CHINA: DISTRIBUTION AND DENSITY

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THE main purpose of this study is to present the prewar distribution and density of population in China by means of two maps, each by a different method, and to interpret the broader aspects of density and distribution patterns revealed by them—patterns prevailing before the dislocation of population which was provoked by Japanese invasion.

The source materials employed in the preparation of the maps were all compiled and published in China. The outline base map showing boundaries of hsien (subdivisions of provinces), at a scale of 1: 5,000,000, was published in 1944 by the Sun Pao Press in Shanghai.[1] Data for the areas of hsien were obtained from the *Yearbook of Civil Affairs,* 1934, published in Chinese by the Chinese Ministry of the Interior. Data for population of hsien were taken from an earlier study by Huang Yong Hu.[2]

Reliable population data for China are extremely difficult to aquire; a country-wide official census has, in fact, never been made. This means that the only population data available are estimates, and these vary in the millions. Several estimates have been made by different agencies employing various methods with conflicting

This contribution to the geography of China is sponsored for publication by Glenn T. Trewartha of the University of Wisconsin, in whose graduate seminar the topic was developed.

[1] A copy of this map was provided by Mr. T. Y. Chow, of the China Institute of Geography in Nanking. Mr. Chow was a Whitbeck Fellow in the Department of Geography, University of Wisconsin, during the academic year 1946–1947. Grateful acknowledgment is made of his assistance in the translation of Chinese data and the location of hsien.

[2] "The Distribution of Population in China" (in Chinese with abstract in English), *Journal of the Geographical Society of China,* Volume 2 (June, 1935), pp. 33–74. The Chinese text prints the tables of data in arabic numerals. At the end of the article are four maps, well executed and bilingually labeled: Relief, Rainfall, Population (dot technique), and Population (isarithmic technique). The first three maps named are on the scale of 1: 20,000,000; the isarithmic population map (in colors) is on the scale of 1: 12,500,00.

results. The maximum estimate is 600,000,000, suggested by J. L. Buck,[3] who immediately qualified the figure by saying that it probably was too high. At the other extreme of estimates made within the last twenty years is the figure of 295,000,000 offered by Walter Willcox.[4] In 1926 a post-office census project produced the astonishingly detailed figure of 485,508,838 for twenty-eight provinces, excluding Outer Mongolia and Tibet.[5] An estimate of 440,000,000 was announced in 1930 by the Maritime Customs, and in 1931 the Ministry of the Interior published a figure of 474,000,000.[6] According to Huang Yong Hu, who compiled the data on which this study is based, China's population was 458,915,439.

A consideration of a few of the methods employed in arriving at these estimates will contribute to an understanding of their lack of agreement. Some estimates were based on the number of taxpaying households multiplied by 5.5, an arbitrary multiple representing the number of members per household. Another method was that of the China Continuation Committee which arranged with competent missionaries familiar with local conditions to check population estimates for their areas. Some estimates have been made even on the basis of salt consumption. With such varying bases for calculations it is understandable why final figures are so far apart. The wide discrepancy of approximately 300,000,000 between the highest and lowest estimates in the last twenty years makes one wonder which is nearer the truth and how the most accurate figures can be selected. This exasperating problem of determining the number of people in China has been discussed previously by several authors who have considered the conundrum in detail.[7]

The most thorough job of sorting all these estimates to determine the most accurate figures was performed by Huang Yong Hu at the National University of Nanking. After checking and appraising all available estimates for all the provinces, then sorting these and carefully winnowing out for each province the figure which in his judgment was most reliable, this Chinese geographer compiled the tables which

[3] Buck, J. L., *Land Utilization in China*, 1937, p. 363.

[4] Willcox, Walter F., *American Studies in Demography*, 1940, p. 528.

[5] Stamp, L. Dudley, *Asia, a Regional and Economic Geography*, 1935, p. 497.

[6] Cressey, George B., *China's Geographic Foundations*, 1934, p. 19.

[7] Chen, Ta, *Population in Modern China*, University of Chicago Press, 1944

Cressey, George B., *Asia's Lands and Peoples*, 1944, pp. 42–45, and *China's Geographic Foundations*, 1934, pp. 17–20

Field, Frederick V., and Baker, Newton D., *Economic Handbook of the Pacific Area*, 1934, pp. 22–23

Pelzer, Karl J., *An Economic Survey of the Pacific Area:* Part I, "Population and Land Utilization," 1941, pp. 32–36

Roxby, Percy M., "The Distribution of Population in China," *Geographical Review*, Vol. 15 (1925), pp. 1–24

Stamp, L. Dudley, *Asia, a Regional and Economic Geography*, 1935, pp. 496–99

Willcox, Walter F., *Studies in American Demography:* Appendix 2, "The Population of China and its Modern Increase," 1940. This is an excellent and thorough discussion of the many estimates and "censuses" in China from 1650 to 1940.

were published in the article referred to above (footnote 2). These tables derive from research rather than from Chinese governmental agencies.

Research workers in China have placed comparatively little faith in many governmental statistics, especially those relating to population. Government reports often are carelessly prepared; for instance, in the preparation of a provincial census the provincial government sends out a blank to each hsien requesting a report on the hsien's population. Possibly the blank is filled in with an arbitrary figure, a guess by some official with little realization of the importance of an accurate census. These blanks of questionable information, when returned to the provincial office, then form the basis for an "official" provincial census. Thus it is understandable why Chinese geographers and other scientists are skeptical of government population censuses.

Unfortunately, the tabulated data prepared by Mr. Hu are not for the same year for all provinces. A nine-year spread exists between the extremes of 1925 for Szechwan and Fukien and 1934 for Anhwei and Chahar.[8] (This discrepancy of a few years is believed to be less disturbing than it would be for data applying to the United States, Japan, or India where more reliable statistics are available.) Nevertheless Mr. Hu's tables are the most trustworthy prewar data available, and it is the intent of this study to make available maps based on these data, showing distribution and density of China's population before the disruptions associated with the Japanese invasion. It will be interesting to compare the patterns shown on these two maps with those revealed by future maps based on postwar data.

Procedures in the preparation of the dot map generally are well known. In the construction of the isarithmic map, the selection of intervals was made according to a frequency graph of hsein population densities.[9]

MAJOR POPULATION CENTERS

In two different cartographic languages these maps tell a similar story: China's population is unevenly distributed with a strong concentration in five areas of dense settlement: Yangtze Delta, North China Plain, Szechwan Basin, Central Basin of the Yangtze, and Southeast Coast. Each of these regions illustrates the general rule of the thronging of multitudes in the lowlands where land is fairly level and alluvial soil accessible. The tendency for population to concentrate in river valleys is apparent in the dendritic distribution pattern in South China. Areas of less dense population surrounding the five regions of high concentration are almost all coincident with rugged terrain and infertile soils.

The Yangtze Delta, the most densely populated of the five regions, is characterized by China's most extensive area of densities exceeding 150 per square li. Since the

[8] Data for Kweichow province employed in this study were taken from the *Kweichow Yearbook*, 1941, on the advice of Mr. T. Y. Chow.

[9] For an explanation of the frequency graph and its application to population maps, see Alexander, John W., and Zahorchak, George A., "Population-Density Maps of the United States: Techniques and Patterns," *Geographical Review*, Vol. 33 (1943), pp. 457–66.

Yearbook of Civil Affairs listed the areas of hsien in terms of square li, the population density is calculated here in terms of number of persons per square li, which is one-ninth of one square mile. A density of 150 per square li equals 1,350 per square mile, a category which includes many areas in China. By contrast, the United States has no areas where population exceeds 1,350 per square mile except within the urban areas of our largest cities. The most densely settled part of the Yangtze Delta is surrounded by a broad expanse of densities exceeding 90 per square li which extends westward to Nanking and southward beyond Hangchow Bay. Adjacent areas of lesser population coincide with a variety of conditions: highlands, Lake Tai in Kiangsu, Chao Lake in Anhwei, the poorly drained salt marshes of Kiangsu's coastal plain, and the poorly drained northern half of Anhwei where the Yellow River formerly flowed and where floods of the Hwai and other streams are frequent.

The North China Plain appears as the broadest area of dense population in China. The close packing of the dots effectively shows this densely populated area in which the density exceeds 90 per square li (810 per square mile). In contrast to the humid, rice-producing Yangtze Delta, the subhumid, non-rice-producing North China Plain does not have a large expanse of densities exceeding 150 per square li. There are only a few of these, and in every case they focus on a large city. Sparsely settled regions surrounding the North China Plain are associated either with hills or with the poorly drained coastal plain flanking the mouth of the Yellow River.

The Szechwan Basin is conspicuous for its isolation, being linked to other populous regions by only a thin thread of population along the Yangtze Valley. Population is not distributed evenly over the Szechwan Basin but is concentrated in three clusters: the Kialing River Valley above Chungking, the Suchow area up the Yangtze from Chungking, and the Chengtu Plain which is the most densely settled rural region in China. In no other part of China are irrigation and terracing so well developed as in Szechwan's Chengtu Plain. The abrupt transition in population density on all sides reflects a sharp increase in local relief. On the north is the Tsinling Shan, the eastern extension of which is the southern limit of high densities on the North China Plain. These two maps emphasize that the Tsinling Shan, which is well known as a major climatic and agricultural divide, is also a significant population divide.

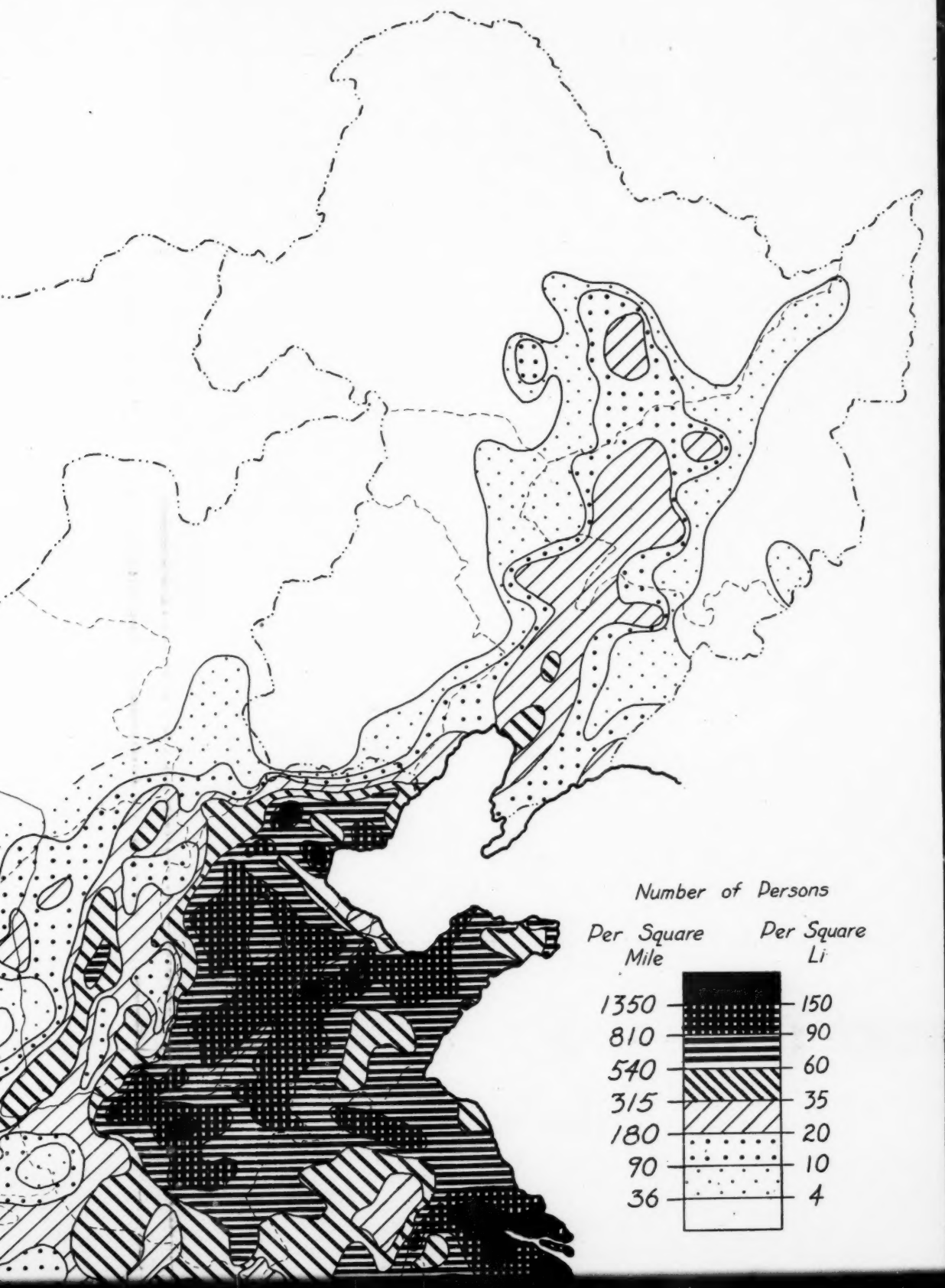
The Central Basin of the Yangtze, including parts of Hunan, Hupei, and Kiangsi, differs from the other four major areas in having no hsien with densities above 150 per square li. The distribution is patchy and is interrupted by highlands. These patches and connecting ribbons of population are associated with the Yangtze Valley and tributary lowlands, including such urban concentrations as the Wu-Han area (Wuchang, Hankow, Hanyang); Ichang, where rapids in the Yangtze mark the upper limit of navigation for large river steamers; Changsha and the Hsiang River Valley south of Tungting Lake; and Nanchang and the Kan River Valley south of Poyang Lake.

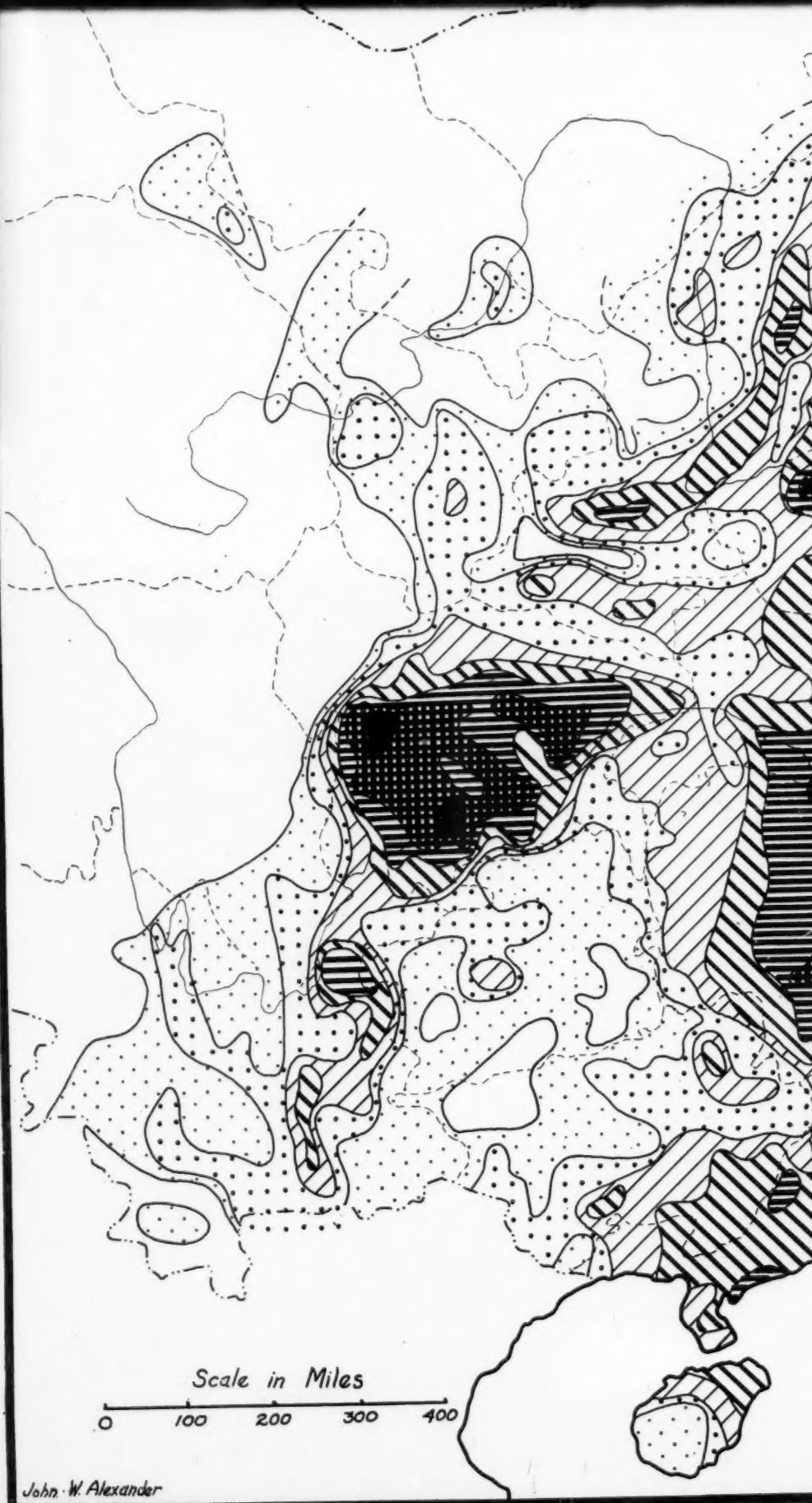
CHINA

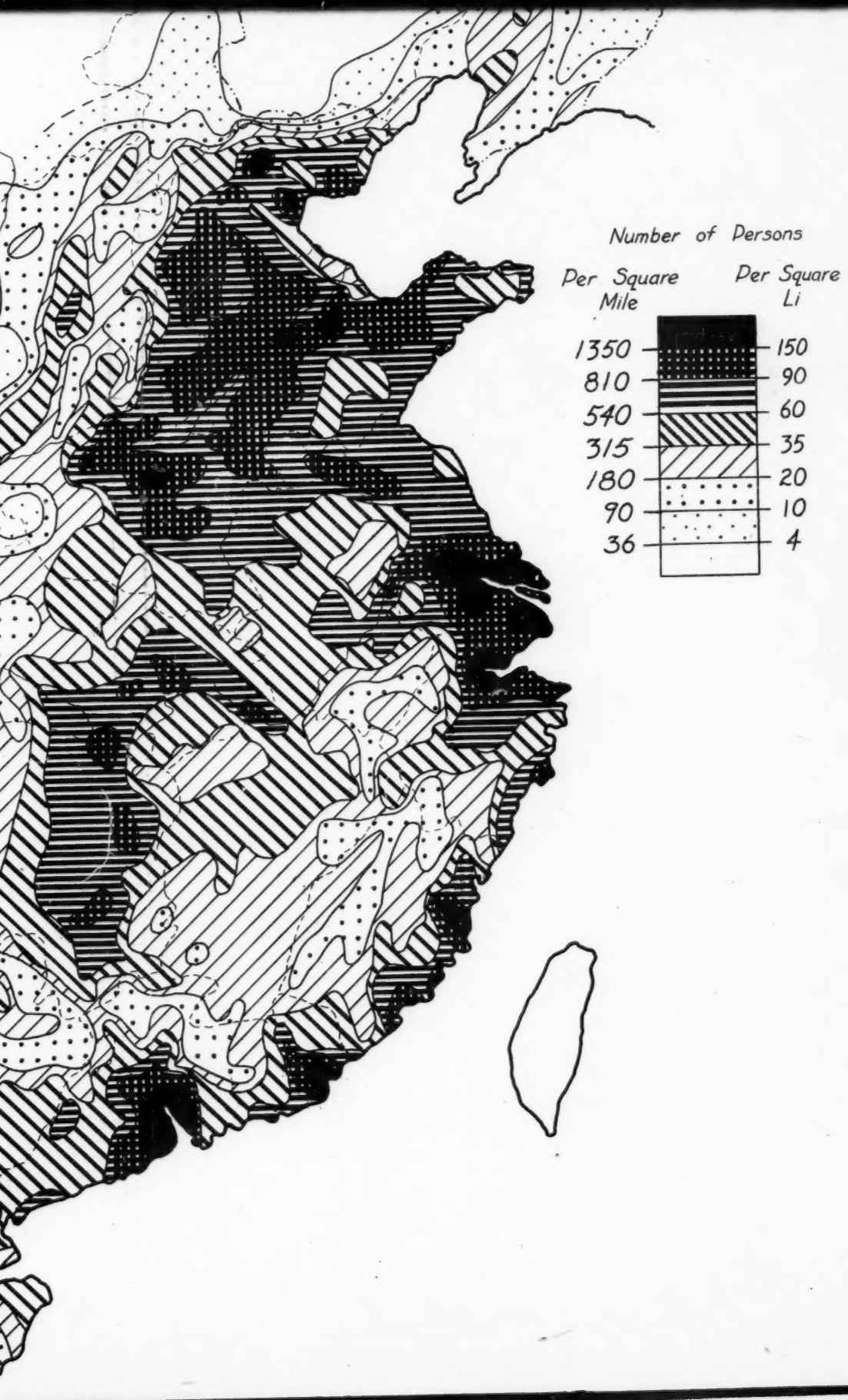
DENSITY of POPULATION

By Hsien

Population Data Compiled by
HUANG YONG HU
in JOURNAL of the GEOGRAPHICAL SOCIETY
of CHINA, June, 1935


Number of Persons
Per Square Mile
Per Square Li
1350
810
540
315
180
90
36
150
90
60
35
20
10
4


Scale in Miles
0
100
200
300
400
John W. Alexander

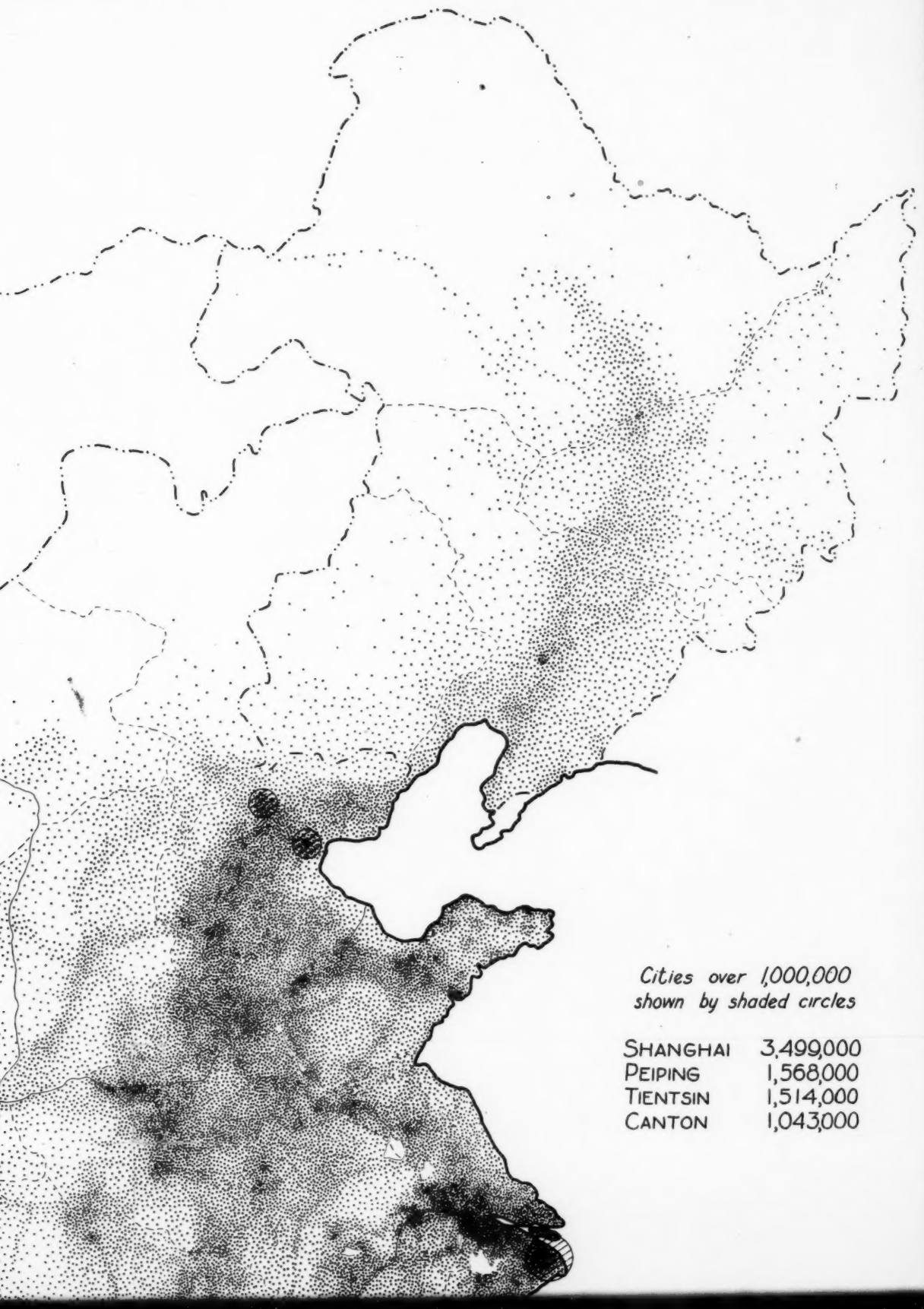

Number of Persons
Per Square Mile
Per Square Li
1350
810
540
315
180
90
36
150
90
60
35
20
10
4

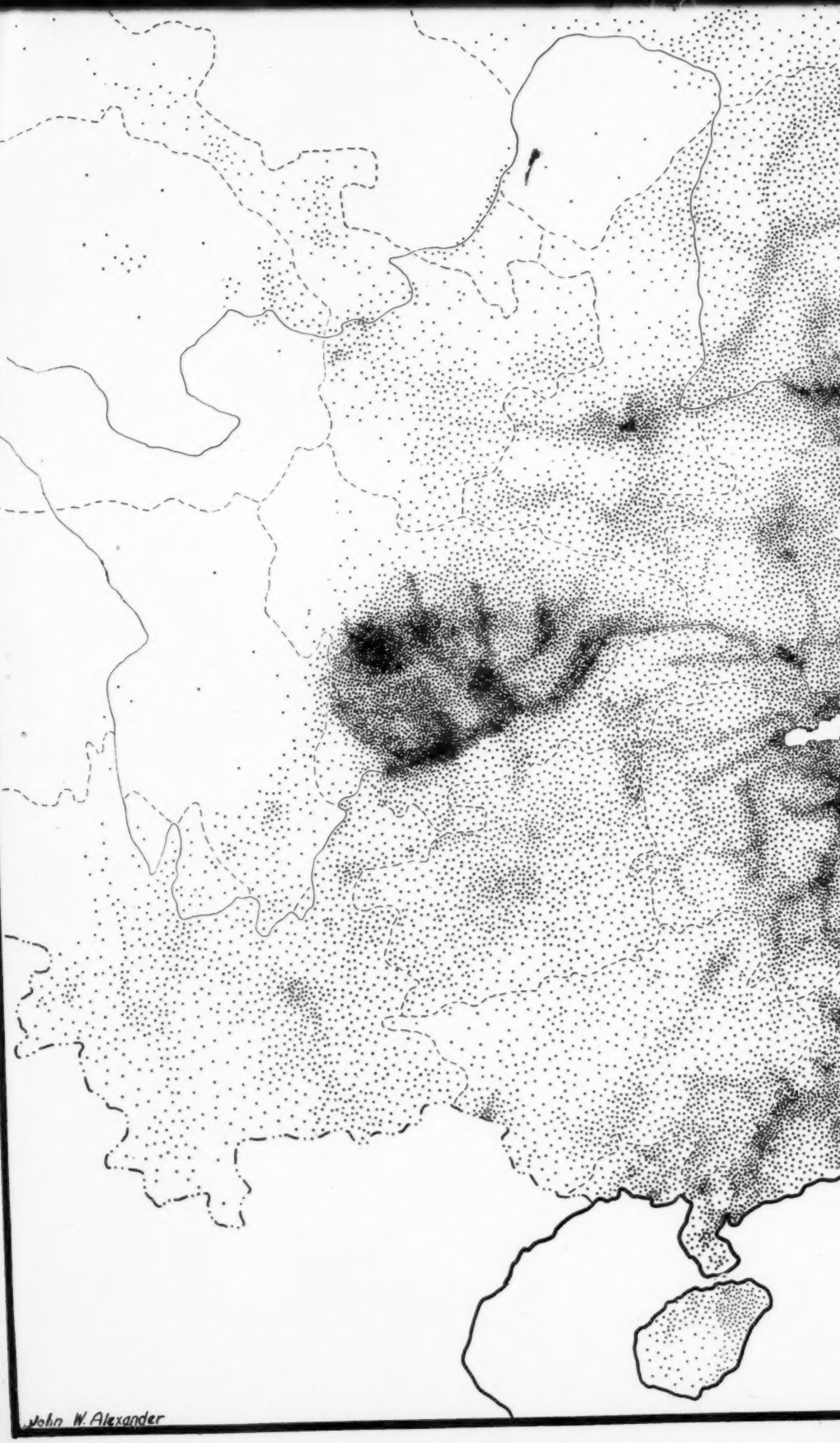
CHINA

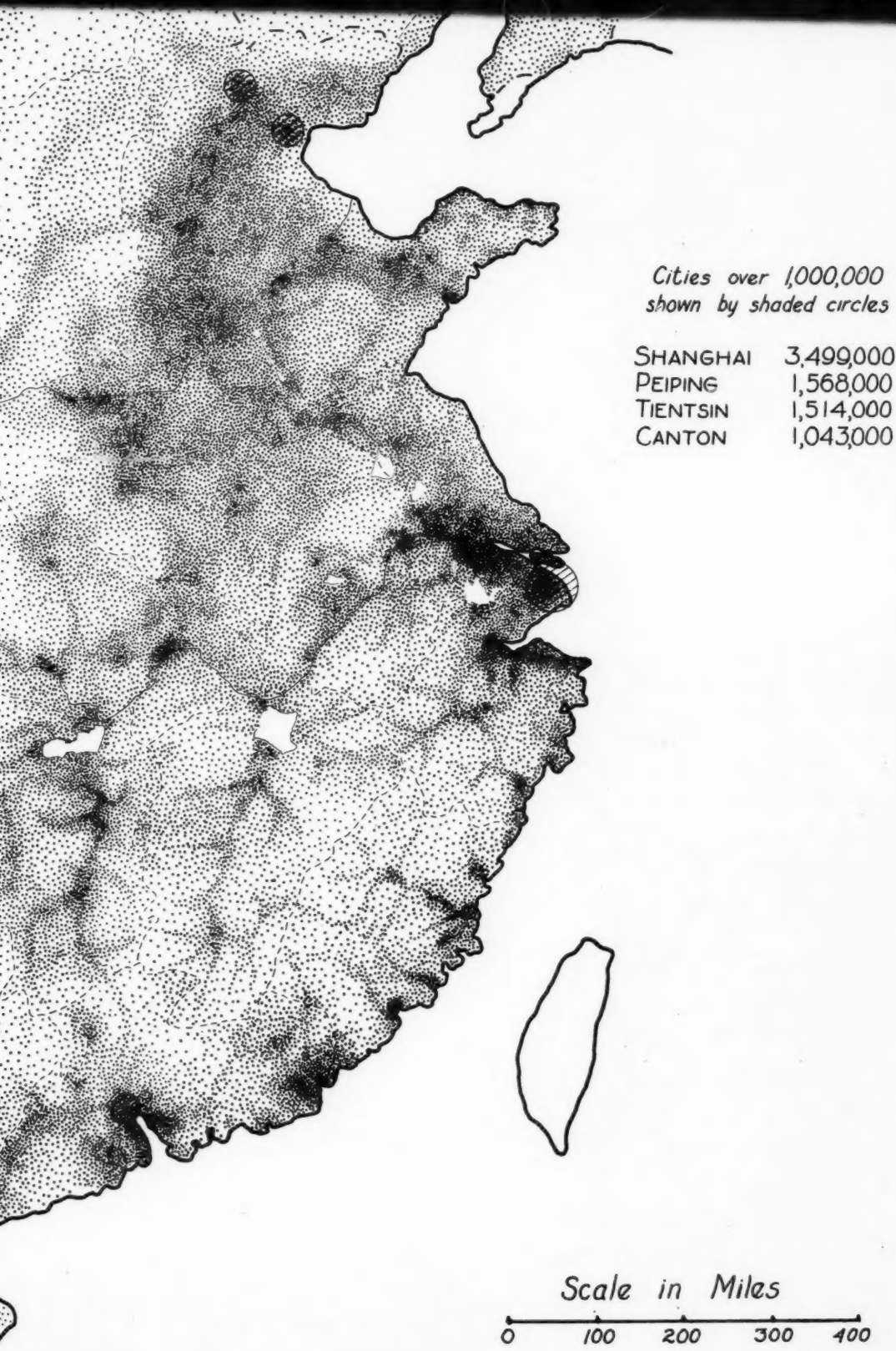
DISTRIBUTION of POPULATION

1 Dot · = 10,000 Persons

Data Compiled by
HUANG YONG HU
in JOURNAL of the GEOGRAPHICAL SOCIETY
of CHINA, June, 1935


Cities over 1,000,000
shown by shaded circles
SHANGHAI 3,499,000
PEIPING 1,568,000
TIENTSIN 1,514,000
CANTON 1,043,000


John W. Alexander


Cities over 1,000,000
shown by shaded circles
SHANGHAI 3,499,000
PEIPING 1,568,000
TIENTSIN 1,514,000
CANTON 1,043,000
Scale in Miles
0 100 200 300 400

The Southeast Coast has a distinct nodal pattern of population distribution reflecting the rugged terrain which encourages urban development only at disconnected valley mouths along the coast. Conspicuous are the deltas on which are located Swatow, Amoy, Foochow, and the Canton Delta which has some of the most densely settled hsien in China. The Canton Delta is linked to the Central Yangtze Basin by a band of rather dense population extending through the saddle between the Pei and Liu river valleys through which runs the one railroad between Canton and the north. The effect of the mountains in this part of China is to separate Southeast China from the rest of the country. This degree of isolation, as well as numerous harbors, contributed to the maritime interests of Southeast China through the centuries. This was the region of China's sailors and fishermen, of her foreign and coastal commerce; this was the China of the American clipper ships. The rest of China, with few good harbors and isolated by the mountains, had little contact with the maritime Southeast except by sea.

REGIONS OF LESSER POPULATION DENSITY

There are four regions of lesser population density. In Manchuria the population is well distributed over the Manchurian plain between Mukden and Harbin, north of which the pattern bifurcates along the Sungari and Nonni rivers. Clusters of population are strung along the railroad northwest of Harbin.

In Shensi and Shansi the distribution of population is in the shape of a crescent beginning in the Wei River Valley in lower Shensi and curving east and north into Shansi along the Fen Valley which, although not the bed of a major stream, is the route of the railroad between Kaifeng and Chiangkiakow. Unexpectedly, perhaps, the dot map shows no particular concentration along the Yellow River. It must be borne in mind that the valley is narrow and cut through rough country, the stream is turbulent, and the river is subject to wide fluctuations between extreme flood and drought which handicap agriculture and transportation. The Shensi-Shansi crescent is linked to the North China Plain by a population corridor through the low pass between Taiyuan and Chengting, the route of the Chengtai Railroad. This crescent is the fertile loess region whose inner margin is bounded by the Ordos Desert inside the great bend of the Yellow River.

The Kansu Corridor has a simple pattern of population distribution, one long line of settlement flanked by voids on both south and north. This represents a string of oases through Kansu at the foot of the lofty Nan Shan and at the edge of the Gobi Desert.

The Yunnan Plateau has a minor cluster of population focusing on Kunming and Kweiyang.

CONCLUSION

With the lack of accurate censuses and the difficulty of procuring good estimates the total of China's population remains extremely vague. The best estimate of China's prewar population is 458,915,439. In the pattern of distribution of these people, five major areas and four minor areas are conspicuous, and all are associated with low relief and good soils.

LIBRARY FILING, CLASSIFICATION, AND CATALOGING OF MAPS, WITH SPECIAL REFERENCE TO WARTIME EXPERIENCE

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THE MAJOR PROBLEM

THE incompletely cataloged condition of most map collections in the United States proved to be a handicap to wartime research. Staff members of the Office of Strategic Services, becoming increasingly aware of the seriousness of the situation, established a Map Information Section in February, 1942. The Section was charged with the duties of procuring, evaluating, and interpreting maps for the parent organization. According to the original instructions, the Section was to restrict its activities to the borrowing of maps from existing resources at the Library of Congress, Department of State, Army Map Service, and American Geographical Society, rather than the assembling of a new collection. These instructions were framed before the magnitude of the problem was understood.

The creation of a union catalog was soon recognized as impossible. Lack of time prohibited the cataloging of the individual map collections, information about their holdings being for the most part unavailable without resorting to the maps themselves. It was necessary therefore to build a collection capable of serving the Operational and Research Staffs of OSS at a time when means of acquiring foreign maps were restricted to the long-established military and naval departments. The problems associated with the acquisition of maps lie outside the present discussion, but the work of the OSS Map Library from its inception until the demobilization of the organization in October 1945 resulted in the gathering of more than two and one-half million sheets. Such large-scale expansion demanded, over and beyond the development of standardized methods of rapid filing, classification, and cataloging and the current maintenance of these services, the formulation of objectives and methods so as to make the maximum number of maps available.

The author is indebted to William Applebaum, C. F. Carlson, R. M. Coffin, C. V. Crittenden, F. W. Foster, C. W. Olmstead, R. F. Scott, and C. J. Thoren, each of whom has contributed to the formulation of the ideas presented. Col. Lawrence Martin has given generously from his knowledge of the problems of map filing, classification, and cataloging, and the criticisms and suggestions he has made of the manuscript in its many forms have been incorporated in the present paper.

OBJECTIVES

Following thorough discussion by the Map Information Section during the early part of 1942, the ideal functions of a map-filing, classifying, and cataloging system were thus formulated:

The filing system should enable the staff not only to find but to enter maps with a minimum of time and effort. It was felt that this could best be accomplished by arrangement of materials according to natural geographic headings dealing with area, subject, scale, date, and authority. Subject-classification should closely follow recognized divisions of the content of geography. The catalog card should enable the user to determine when the map is not applicable to his particular problem, and should contain a minimum of personal interpretation.

PRELIMINARY CONSIDERATIONS

The establishment of objectives was followed by an examination of existing library processing methods and techniques in the hope that some suitable system might be found. Geographers have often expressed dissatisfaction with ordinary library classification of geographical materials. The Boggs Report[1] has described the shortcomings of the Dewey Decimal System and the Library of Congress classifications. These methods, neither of which was found wholly suitable in 1936, were again rejected in 1942, both for inadequacy of subject-classification and card content and for excessive time requirement in the cataloging process.

Upon examination and discussion of the methods employed by the American Geographical Society and the closely related Boggs-Lewis plan, it was found that although suitable geographical subject-headings were used, neither was applicable to OSS purposes. The success of the American Geographical Society Research Catalog was believed to rest, in part at least, on the abilities and experience of the highly trained staff and the relatively low rate of procurement. The inability of the Department of State, using the Boggs-Lewis method, to maintain a balance between acquisition and cataloging prior to the war appeared to warrant the conclusion that this method, though adequate for libraries with limited programs, would not permit the rapid dispatch of filing, classifying, and cataloging essential to the OSS plan.

A comparative test of time required to catalog a series of twenty-five "average" maps (selected by officers of the Division of Maps, Library of Congress, and the Map Division, Department of State) demonstrated that the above opinions (formed in 1942) were correct. Expert catalogers from the Department of State and the Library of Congress required an average of forty-four minutes and forty-eight minutes respectively to catalog a single map. In more recent trials using the same series of maps but following the method recommended in this discussion, it was found that a catalog card was processed in approximately nineteen minutes. Thus, in terms of an eight-hour day, only ten maps could be cataloged using Library of

[1] Boggs, S. W., "Library Classification and Cataloging of Geographic Materials," *Annals Assoc. Amer. Geogs.*, Vol. XXVI, No. 2, June 1936, pp. 49–93.

Congress methods, and twelve by the Boggs-Lewis plan; but twenty-five could be completed by the method under discussion.

From an examination of the Williams System employed by the Army Map Service, many constructive ideas were obtained, some of which have been incorporated into the method finally determined upon. Viewed from the professional standpoint, the system is satisfactory in that it permits classification according to area and entry into the card-catalog by area, subject, author, date, and scale. It suffered, however, from thoughtless wartime expansion of the subject-headings, with little regard for geographic standards, to a point which threatened to destroy the entire system.

Little agreement in classification methods was found among major American libraries. A later study of the outstanding collections in England, Scotland, France, Belgium, the Netherlands, and Germany revealed even greater divergence of practices in processing maps. The decision, therefore, was to make a fresh start. The present discussion will explain the technique ultimately devised, one that borrows from many plans and embraces the objectives previously mentioned. It is believed to avoid many of the costly and unnecessary steps that have plagued established collections and have been largely responsible for their inability to maintain a balance between acquisition and cataloging.

RECOMMENDED PROCEDURES—FILING

One of the long-cherished ambitions of map librarians has been the possession of sufficient filing space to permit segregation of cataloged and uncataloged maps. Few if any libraries have achieved this goal, for acquisitions of maps and other documents tend to outrun additions to storage space. As a result, cataloged and uncataloged maps are often filed together. Hence, the method of filing is of paramount importance, for misplaced maps are, for all practical purposes, lost. In a well-arranged collection all maps of the same area dealing with the same subject are placed near together. They are filed primarily according to coverage and secondarily by subject. The latter, however, is more closely related to classification and will be considered under that heading.

AREA

Fundamentally, all maps portray space relationships. Regardless of size, each map shows a segment of the world and gives geographical information about the landscape it covers. Since all maps are not concerned with areas of identical size, some form of graduated area-classification must be established in order that related maps may be grouped. Map coverage may be used to establish criteria for the segregation of sheets into workable filing units. The immediate problem becomes one of determining what organizations are engaged in cartographic work, and the scope of their operations.* All map-makers, regardless of nationality, produce small-

* See Appendix I.

scale maps of the world and its major physical divisions. These larger segments of the earth, based on physical rather than political criteria, are international from the map-maker's standpoint and may be grouped thus:

1. World
2. Hemispheres
3. Continents and oceans
4. Parts of continents and oceans embracing more than a single major political unit

It is well known that most survey and intelligence maps are produced by official government agencies and therefore are compiled on a country basis. Except in wartime, British cartographers are limited to the preparation of maps of Great Britain, its Dominions, Colonies, and other dependencies. Similarly, French, German, American, and all other governmental map-makers are generally confined by political borders. Apart from survey mapping, both governmental and private research staffs rely on statistics for the compilation of intelligence maps, and all official statistics are collected according to international or internal political boundaries. Therefore, because of the domination of almost all areas by political forces, most maps have political areas as factors inherent in their construction. The following divisions of the world, then, are based on political, rather than physical criteria:

5. Major political areas, nations, or detached dominions, colonies, condominiums, or protectorates
6. Parts of major political areas smaller than the whole but embracing more than one of the first order of civil divisions
7. Civil divisions, comparable to but not necessarily identical in political importance with the states of the United States

These seven classes of size require a minimum of codification and, with the exception of (4) and (6), agree with those used by both professional geographers and laymen, so that maps of the world, hemispheres, continents, and oceans may be filed in accordance with common nomenclature. The lesser portions of the world require some codification, and the following three divisions, *Primary Regions, Secondary* and *Tertiary Filing Divisions,* have proven satisfactory.

PRIMARY REGIONS

The accompanying map (p. 37) offers a solution to the area-filing problem for those parts of the world which are smaller than continents, but contain more than a single political unit. The compilation is based on an examination of the larger parts of the world in relation to areas usually contained on maps. The twenty-two divisions serve as *Primary Filing Regions* within which all maps covering parts of continents or oceans may be filed, but to avoid unwieldiness further classification is necessary.

SECONDARY FILING DIVISIONS*

During the war, cartographic agencies associated with all belligerents worked at top speed to prepare military operational maps. The Army Map Service, British Directorate of Military Survey, *Reichsamnt für Landesaufnahme,* and *Abteilung für Kriegskarten und Vermessungswesen,* among others, compiled, revised, and printed more maps than were ever before published in a comparable period. The titles of the great majority of the maps show that they were made on a country basis, and catalogs prepared by these agencies list individual publications and original surveys according to nationality. Thus various items are known as the "French 50s," "Italian 25s," "German 100s," "Japanese 50s," or "Chinese 50s," an indication of the national territory concerned and the scale of each set—the latter dropping the last three zeros.

In similar fashion, intelligence maps prepared for planning or educational purposes are usually compiled from statistics collected on a political basis. Chorographic publications are generally concerned with countries and deal with comparisons between sovereign states or between sections of a single country. Maps used in these studies present geographic patterns on a nationalistic basis, and reflect geographic preoccupation with national territories. All of the geographic studies prepared during the war were planned according to country outlines. The Joint Army-Navy Intelligence Studies (JANIS), Inter-Service Intelligence Studies (ISIS), and the *Militärgeographische Angeben* all bear country titles. In the realm of geographical text books, the large majority of continental volumes are similarly organized. The maps contained in both kinds of studies are prepared to illustrate national patterns of distribution. Only one exception to the general preoccupation of cartographers and geographers with political area was encountered, and this was confined to the islands of the sea which were treated according to location rather than political affiliation.

The Secondary Filing Divisions are derived from a study of the most recent available catalogs of American and foreign governmental map agencies. In accordance with the practices of these organizations, the names of nations, dominions, colonies, protectorates, mandates, and other dependencies have been used except in those oceanic areas where geographical factors appeared to be more important, and in North America. Islands of the sea have been grouped according to their relationship with other land bodies. Where several islands comprise a traditional group, such as the Hawaiian Islands or the Islands of the Celebes Sea, the generally accepted nomenclature has been employed. The North American area, because of its significance to most American libraries, warrants a greater refinement of filing methods, and States of the United States, Canadian Provinces, and Alaskan Judicial Districts, all of which are of comparable administrative significance within their respective borders, have been used as Secondary Filing Divisions.

* See Appendix II.

TERTIARY FILING DIVISIONS

The mapping of areas smaller than countries is largely the concern of state or provincial governments, and is usually accomplished by local administrative divisions. Abroad, many state surveys and atlases, best illustrated by the older Bavarian and Prussian publications, have been published. In the United States the influence of local administrative divisions is reflected in the mutual state and federal responsibility for the USGS Topographic Survey, and in the compilation of all census statistics according to minor civil divisions. Aside from these joint projects, most local mapping is undertaken by county, township, or municipal authorities and may be exemplified by county and township cadastral, road, and soils maps, and the cartographic work of municipal engineers.

The Tertiary Filing Divisions are the largest domestic political-administrative divisions of nearly every country in the world, compiled from the sources indicated. Exceptions have been made in dealing with islands of the sea and the North American areas. The former were derived from a locational classification of smaller island groups and the insular parts of those larger archipelagos appearing as Secondary Filing Divisions; the latter were derived from a compilation of American counties and comparable Canadian minor civil divisions.

EXPANSION AND POLITICAL CHANGE

Because they are readily adaptable to changing world affairs, the preceding area-classifications have several advantages not inherent in methods requiring exact delimitation. International and national occurrences affecting a map filing system are (1) alterations in the political control of territory, and (2) changes in the relative importance of domestic areas. Areal expansion of a nation or internal growth may result in the subdivision of existing minor civil divisions or establishment of new local administrative zones, either of which requires alteration of most filing systems. A method utilizing international and domestic civil divisions with a minimum of codification can most easily accommodate the growth or decline of individual areas, for the only changes required to cope with changing political affairs are additions of official political nomenclature to the already existing Secondary or Tertiary Filing Divisions. Since these are nothing more than the names of nations and their respective administrative units in abbreviated form, modifications can be made with ease.

Changes in international boundaries do not affect filing, for all coverage should be retained together regardless of commutation of territory. Maps that do not represent current conditions are historical documents and a filing system which recognizes the obsolescence of maps allows the ready withdrawal of those items most usable for a particular era. The flexibility of the recommended technique recognizes the metamorphosis characteristic of all political regions.

COVERAGE AND MAP TYPES

No filing system capable of exact delimitation of area coverage has ever been devised, for the infinite possibilities of cartographic representation require endless

classification. A compromise between area and classification is necessary and the Williams System uses a satisfactory means of distinguishing between maps which offer complete or partial coverage of an area.[2] Those affording complete coverage of a filing region or division are classed as "General Maps," while those representing only a portion of a filing area are called "Part Maps." Distinction between these broad groupings is based on total planned coverage regardless of the availability of individual sheets. Application of these terms as a part of the recommended system permits a maximum number of maps to be designated as "General" and a correspondingly smaller number of items to be classified as "Part Maps," because most cartographic representations deal with political areas—the foundation of the present proposal.

Map types are related to filing problems and to the distribution of map information as well. Each type should be filed with others of its kind; all set maps of a given area should be kept together and each remaining type should be similarly grouped. For filing and informational use, all maps may be divided into the following groups:—

Type of map	*Code*
Atlas	A
General Map	G
Part Map	P
Set Map	S
Wall Map	W

PREPARATION FOR FILING

It is most convenient to assign traditionally accepted names or their common abbreviations to the several files and the maps they contain. World, hemisphere, continental, and oceanic coverage can be easily identified by use of generally known nomenclature; earth segments that depart from customary usage require a minimum of codification. These may be identified by the combination of Roman numerals, upper- and lower-case letters indicated on the accompanying map and the appendix, according to the coverage of the map in question. Using this method, well known maps are cited for exemplification in Table I.

RECOMMENDED PROCEDURES—SUBJECT-CLASSIFICATION

The selection of subject classifications is related to both filing and cataloging, for information about an area is secondary only to the concept of area itself, and the selection of appropriate maps can be accomplished most satisfactorily through adequate subject-headings in a card catalog. To date no library-devised subject-classification has given adequate attention to the categorization of maps. Some systems try to tell the user of the underlying purpose for which a map was made

[2] Terrell, J. P., "The Williams System of Classification, Cataloging, Indexing, Filing, and Care of Maps," M.I.D., War Department, Washington, D.C., 1930. 26 pp.

through the inclusion of such headings as "military," "travel," and "cartoon," while others recommend the uses to which a document may be profitably employed in the judgment of the cataloger. No system seems to have been devised for the purpose of reporting as much data as possible about the content of the map, leaving to the user the determination of its value for his purposes.

TABLE I

Title of Map	Order of World Filing System	File position
Physische Weltkarte (Haack)	World	World
Die Alte Welt (Haack)	Hemisphere	Eastern Hemisphere
Map of the Americas 5M (A.G.S.)	Continent	Latin America
Mittelmeerlander (Haack)	Primary Region	IV
USGS Topographic Map 1: 62,500	Primary Region	XIII
Ordnance Survey, Great Britain	Primary Region	II
Carte de France 1: 50,000 (IGN)	Secondary Filing Division	III F
Road Map, Eastern United States (AAA)	Primary Region (Part)	XIII
Road Map of Alabama (AAA)	Secondary Filing Division	XIII ALA
Autauga County, Alabama, Road Map	Tertiary Filing Division	XIII ALA a
Topographische Karte 1: 25,000 (Pr.Lan.)	Tertiary Filing Division	III G.p

Maps are peculiarly geographical documents, inseparable from the body of geographic knowledge, and recognized by some geographers to be the core of the subject. That they are mutually and intrinsically interrelated is indicated by geographic custom and literature. According to Hartshorne: "Geography, as the study of the world . . . consists of either physical (natural) or economic geography" . . . while regional geography is "the *integration* of all branches of systematic geography, focussed on a particular place in the earth surface."[3] Elaboration of the content of systematic geography and regional geography along the lines of these definitions leads to a trend of subject matter which is paralleled by various definitions of maps, and their division into different categories.[4] According to some authorities, maps are broadly divisible into "locational and topical," the former showing a combination of important features (e.g., coastlines, cities, political units), the latter emphasizing specific phenomena only (e.g., density of population, railways). In dictionary and encyclopedia language, maps may be either "general or special," but so infinitely adaptable as to permit representation of every subject connected with geographical distribution.

An acceptance of the kinship of maps and geography, upheld by the professional authorities quoted, may be followed by an examination of the content of geography and the possibility of using a ready-made classification of the subject for the purpose

[3] Hartshorne, Richard, "The Nature of Geography," *Annals Assoc. Amer. Geogs.*, Vol. XXIX (1939), Nos. 3 and 4, refs. pp. 399 and 147.

[4] For example, Wright, J. K., and Platt, E. T., *Aids to Geographical Research*, American Geographical Society, Research Series, No. 22, 2nd ed., Columbia Univ. Press, New York, 1947, p. 83.

of devising a subject-classification for maps. James has modified the writings of Jean Brunhes and Sten deGeer into a generally accepted outline of the content of landscape.[5] Since many regional geographers regard the earth as a mosaic of landscapes, the outline may be accepted as a subject-classification of geography including both regional and systematic approaches, as defined by Hartshorne. Because maps, by definition, are concerned with all geographical distributions, the subjects they portray embrace all of the content of geography and at the same time are limited to those same subjects. The subject-classifications listed in Table II were derived from the foregoing classification. Alterations are limited to rewording several of the headings and the addition of Cadastral, Base-Outline, History, Topography, and City Plan.

TABLE II

Physical landscape	Cultural landscape	
Climate	Agriculture and Fishing	Pipelines
Drainage	Air Communications	Power
Fauna	Base-Outline	Population
Flora	Cadastral	Political Boundaries
Geology	City Plan	Roads
Terrain	Forestry	Railroads
	History	Settlement
	Industry and Commerce	Topography
	Minerals	Waterways

RECOMMENDED PROCEDURES—CATALOGING

A card catalog is the ultimate physical expression of the analysis through which each newly obtained map must pass from the time of accession until it has been filed, classified, and cataloged. The utility of each document is directly affected by the quantity and quality of the data recorded on the card that represents it in the catalog. No verbal expression can serve as a satisfactory substitute for the original map, but the inclusion of a maximum of data on a card will cut down fruitless withdrawal and refiling on the part of the library staff, and aid the user by permitting rejection of unsuitable items. The card should enable entry into the collection by all possible avenues of approach. War experience has indicated that the most important items are area, subject, scale, date, type of map, author-publisher, edition, and projection. A catalog entry exhibiting these data enables all relevant maps to be screened prior to withdrawal, and limits the examination to pertinent items from which the user can select and request those documents of apparent interest. But the card has other equally important functions to perform for the collection; it must identify each map so that no doubt as to the particular document can arise; furthermore, it should indicate the immediate source from which the map was obtained, and tell the

[5] James, Preston E., *An Outline of Geography*, Ginn & Co., Boston, 1935, p. 11. Outlines modified from deGeer, Sten, "On the Definition Method and Classification of Geography," *Geografiska Annaler*, 1923, pp. 1–37; and Brunhes, Jean, *Human Geography*, Rand McNally & Co., New York, 1910.

file location of the required item. To fulfill these needs and also to keep to a minimum the time and expense necessary for completion of all other filing, classifying, and cataloging systems, the Map Information Section called upon the services of a business-records concern, and with the combined efforts of both geographers and records experts a standardized cataloging form was designed.

The accompanying card represents the most recent edition of the form designed in 1942 (Fig. 1). Although it was drawn up for use with the system under discussion, it is adaptable to the preliminary work of other cataloging methods. The entire card is divided into four sections: 1. Above the double line, required data are limited to information and identification entries. 2. Directly below, space is devoted to recording the subject content of a map. 3. At the bottom of the card, remarks about the details of the information given above can be recorded. 4. Along the sides, divisions for listing the location of identical maps housed in other collections have been provided. Use of the form according to directions will expedite and standardize cataloging operations and remove a large share of personal interpretation from the finished catalog. In practice, the work can be divided into four stages corresponding to the sections of the form.

IDENTIFICATION

For complete identification of a map, all relevant information must be given in the appropriate parts of the identification section, as follows:

1). *Map Number* refers to serial numbers assigned by the publishing agency. Many agencies, including the Army Map Service, Hydrographic Office, Department of State, Office of Strategic Services, and most foreign map houses, print series or job numbers on each publication. Maps can be obtained most easily from these sources by reference to the map number.

2). *Filed As* is completed by assignment of a document to a Primary Region, Secondary or Tertiary Filing Division, and the recording of the Roman numeral, upper- and lower-case letters pertaining to the area covered.

3). *Subjects* classification is automatically accomplished upon the completion of the *Content* part of the card. In case more than one of the twenty-six major headings is selected, duplicates, except for subject entry, should be filed in appropriate sections of the card catalog.

4). *Language* in which the map is printed should be indicated. Place-names should be disregarded in making the selection because of the inclination of map makers to use domestic nomenclature for place designation and their own language for legend and marginal data.

5). *Title* should be transcribed and, in the case of non-romanic alphabets, transliteration according to accepted systems should be employed.

6). *Accession Number* should be assigned to each item. A separate number should be used for each sheet in a set and for each duplicate held in the collection. Only by this means can an accurate record of loan transactions be maintained and a record of the total number of maps be kept. Each duplicate should be filed in the card catalog as a separate entry.

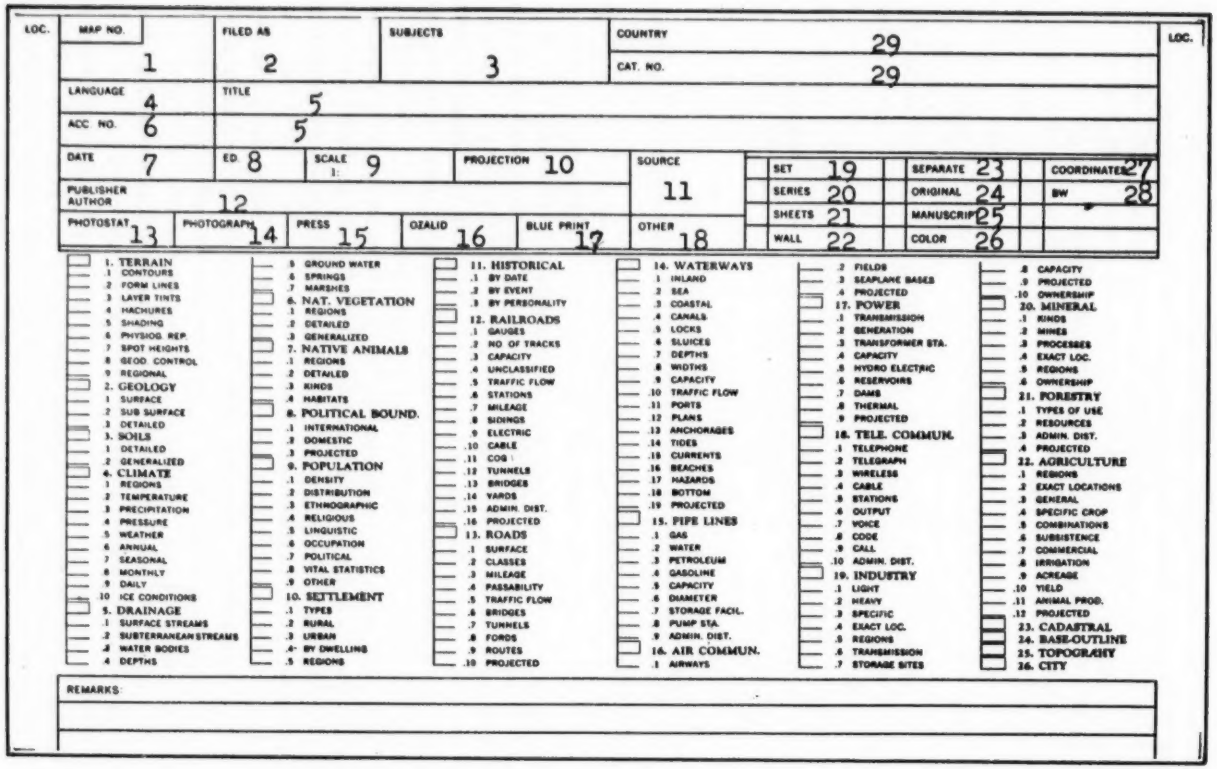

FIG. 1. Catalog entry card. See text for explanation of numbering system.

7). *Date* refers to the time of publication rather than date of compilation data. Variations between these two can be indicated under *Remarks* if they are significant and not included in the title.

8). *Edition* of each map should be recorded separately and various editions of identical sets should be filed separately.

9). *Scale* should be entered as a representative fraction.

10). *Projection* should be recorded whenever it is identifiable; otherwise, "Not Stated."

11). *Source* is used to denote the immediate source from which the copy on file in the collection was obtained.

12). *Publisher/Author* is a compromise heading. Authorship should be listed whenever possible and considerable effort should be made to obtain this information, for it is a direct indication of the quality of a map. However, personal responsibility cannot always be determined, especially in dealing with maps issued by governmental agencies. In the absence of authorship information, *Publisher* serves as a weaker means of determining responsibility.

13–18). *Photostat, Photograph, Press, Ozalid, Blue Print, Other* refer to the method of reproduction used in making the individual copy under consideration. If it is a photographic or photostatic copy of a printed map, the card should indicate that fact.

19–25). *Set, Series, Sheets, Wall, Separate, Original, Manuscript* are used to distinguish between types of maps. *Set* maps portray area through the use of several sheets, all of which are uniform in scale, projection, marginal data, and symbolization. Adjoining sheets must match, although it may be impossible to assemble the entire set on a plane surface. *Series* maps are defined as a number of sheets dealing with the same subject. They may be compiled from a single base used repeatedly to show different distributions, or they may be prepared on overlapping bases of a varying scale. *Sheets* is a descriptive term borrowed from advertising jargon. It is used to describe a map printed in several sections that may be joined together to form a single map. Many *Wall* maps are printed on separate sheets, but the emphasis placed on visibility when viewed from a distance warrants a distinction. *Separate* maps are printed on single sheets of paper and are complete within themselves. *Original* documents are printed by the originating publishers and may be distinguished from reprints made by other concerns. Many governmental agencies during the war reprinted maps prepared by other foreign and domestic official and commercial map makers. Distinction between these similar items will enable avoidance of serious filing and cataloging problems at a later date. *Manuscript* denotes items requiring special treatment because of their uniqueness. The term may be used to refer to historical maps, fair drawings, compilation sheets, or printed maps upon which additional data have been superimposed by hand.

26). *Color* is used to indicate all maps other than monochrome printings.

27). *Coördinates* is used to indicate maps equipped with a military grid in addition to the geographical grid or those in which the intersections of latitude and

longitude or merely stub representation of the meridians and parallels are indicated at the neat line.

28). *BW* is employed to describe monochrome or black and white maps.

29). *Country* and *Catalog Number* are recorded after filing division, coverage, type of map, subject, author-publisher, date, and scale have been determined, for the majority of these ways of entering a card catalog will appear as the end-product of filing, classifying, and cataloging operations.

SUBJECT CONTENT

The content of maps listed in Table II is used to classify subjects appearing on maps. These items make up the twenty-six subject-headings printed in boldface type on the central part of the card. A varying number of subheadings have been listed under each. In practice, legend and marginal information and a minimum amount of base data, which serves as a skeleton for the subject of the map, are recorded opposite appropriate subheadings. After this transfer has been completed, the distribution of check-marks opposite subheadings will automatically indicate the appropriate subject classification of the map. Base data should be disregarded in marking the subject opposite one or more appropriate subject-headings. Usually, the distribution of selected legend and marginal data will limit the selection of subject to a single heading, but the presence of more than a single topic only means that duplicate cards should be filed in the catalog under appropriate catalog classes. Exceptions to this procedure are made in the case of Historical (11), Topography (25), and City (26). The first takes precedence over all recorded information if the map deals with a historical event, date, or personality; Topography is used to denote a map dealing with the complex of landscape found on the characteristics sheet of a topographic survey; and City is employed to segregate city plans.

ASSIGNMENT OF COUNTRY AND CATALOG NUMBER

The final step in the involved process of filing, classifying, and cataloging a map serves to bring together all salient information about the document by means of the Country and Catalog Number (29). The selection of these items permits the user to choose maps by means of any combination of area, subject, type of map, authority, date, and scale. If the codification is unfamiliar, the same data may be obtained from the body of the card.

The Country notation should be readily understood by the average user by a direct relationship to the traditional nomenclature of physical and political features. The major physical divisions of the earth as well as the names of nations offer the simplest means of identification, and the Primary Filing Regions were delimited with this idea in mind. Thus, the following customary designations can be applied to each region: (I) Scandinavia, (II) British Isles, (III) Central Europe, (IV) Mediterranean, (V) Southern Africa, (VI) U.S.S.R., (VII) Far East, (VIII) Southeast Asia, (IX) Near East, (X) Southern Latin America, (XI) Northern Latin America, (XII) Caribbean, (XIII) United States, (XIV) Alaska, (XV)

Canada, (XVI) North Atlantic, (XVII) South Atlantic, (XVIII) North Pacific, (XIX) South Pacific, (XX) Indian Ocean, (XXI) Arctic, and (XXII) Antarctic. Within each of these areas, Secondary and Tertiary Filing Divisions employ the most widely recognized political appellations for the territory. Assignment to file should be made according to the smallest possible order of size but it will seldom be necessary to use domestic political divisions for cataloging purposes. Except for the United States, Canada, and Alaska, Tertiary Filing Divisions will be of greatest value to American map collections as a means of filing.

The Catalog Number is derived from the identification and content portions of the card and enables the user to tell at a glance the area, type of map, subject, publisher/date, and scale, for all of these data are given in the complete notation. The area designation is selected from the appropriate Primary, Secondary, or Tertiary division as indicated; the type of map, publisher/date, scale, and subject are derived from the previously completed card. A random sampling of various maps will illustrate the method (Table III).

TABLE III

Map	Area	Type	Subject	Publisher/ Date	Scale	Country and Catalog number
USGS Topographic Map, 1:62,500	United States	Set	Topography	USGS	1:62,500	US S/25/USGS/62
Goode's School Atlas, 1932 Edition, Rand McNally	World	Atlas	Topography	1932	Goode	World A/1932/Goode
Map of the Americas, 1:5 million, A.G.S., 1943	Latin America	General	Topography	1943	1:5,000,000	Latin America G/25/1943/5,000
Danzig and the Polish Corridor, 1:340,000, National Geographic Society, 1939	Poland	Part	Political boundary	1939	1:340,000	Poland P/8/1939/340
Afrika, 1:6,000,000, Justus Perthes-Haack, 1944	Africa	Wall	Topography	1944	1:6,000,000	Africa W/25/1944/6,000
Germany, 1:2,000,000, Bartholomew & Sons, 1944	Germany	General	Topography	1944	1:2,000,000	Germany G/25/1944/2,000
Reichs-Auto-Karte, 1:300,000, Reichsamnt für Landesaufnahme, 1924–1929	Germany	Set	Roads	R für L	1:300,000	Germany S/13/RfL/300
Atlas Historique de la France, A. Longnon, Paris, 1885	France	Atlas	Historical	1885	Longnon	France A/11/1885/Longnon
Geologische Uebersichtskarte von Württemberg, Württemberg Statistisches Landesamt, 1:200,000, 1930	Germany	Part	Geology	1930	1:200,000	Germany P/2/1930/200

The examples set forth in Table III are representative of the *Country* and *Catalog Number* obtained by use of the method under discussion. Although there is a general similarity, certain obvious variations have been made in order to cope with the several types of cartographic material. The first of these concerns the substitution of publishing authority or author for date of publication in dealing with set maps. The extended time during which the individual sheets of a set are published precludes the use of a single year for the identification of the map. The publisher, however, remains a constant means of identification and the use of the commonly understood initials of the issuing authority serves to unite the set in filing and research.

In contrast to sets, atlases can most easily be identified by means of the year of printing and the authorship of the volume. In this respect, atlases are more closely akin to books than are any other cartographic works. Unlike sets, atlases may vary in scale and projection from sheet to sheet, and as a result scale cannot be used to identify them. It has been found most satisfactory to substitute the author's name for scale as a means of positive identification. Substitution of the name for scale makes it impossible to confuse date of publication with a numerical representation of scale.

CONCLUSIONS

At the outset of the discussion, primary objectives relative to the problems of filing, classifying, and cataloging maps were presented. These serve as a means of evaluating any processing method, for they were devised on an idealistic basis. The techniques described have proven to be satisfactory in the following ways:

1). The filing method is flexible enough to accommodate alterations in the political status of an area without upset to the fundamental premise. It results in the grouping of all like documents, and is readily understood by all types of library users.

2). The subject-classifications are closely related to the content of geography and serve to inform the user of the information contained on the maps, without evaluating their usefulness.

3). The use of a check-card reduces to a minimum personal interpretation of map data, increases standardization of information (lacking in all other methods), and expedites entry by bringing together all data about area, subject, scale, date, and author-publisher, in Country and Catalog Number.

4). Time trials have demonstrated that the rate of cataloging accessions has been improved 100 per cent in comparison with the Library of Congress, Dewey Decimal, and Boggs-Lewis methods.

APPENDIX I

The primary Regions, Secondary and Tertiary Filing Divisions are based on map coverage. This was determined through an examination of original maps and wartime emergency recompilations. The following sources, which discuss both types of maps, were used to determine the limits of each filing division. While each volume is a product of American, British, or German research, none except the Army Map Service catalog is limited to recent military maps.

"Map Catalog," Army Map Service, Corps of Engineers, War Department, Washington, D.C., 1944

"Catalog of Aeronautical Charts," Aeronautical Chart Service, Army Air Forces, War Department, Washington, D.C., 1944

"Hydrographic Charts," U.S. Hydrographic Office, U.S. Navy, Washington, D.C., 1944

"Map Catalog," Geographical Section, General Staff, Directorate of Military Survey, War Office, London, England, 1944

"Catalog of Admiralty Charts and other Hydrographic Publications," His Majesty's Stationer's Office, London, England, 1943

"Map Catalog," Survey of India, Calcutta, 1942

"Notes on Maps of the Balkans," Geographical Section, General Staff, Directorate of Military Survey, War Office, London, England, July, 1944

"Notes on G.S.G.S. Maps of Germany, Denmark, and Central Europe," Geographical Section, General Staff, Directorate of Military Survey, War Office, London, England, March, 1944

"Notes on G.S.G.S. Maps of France, Belgium, and Holland," Geographical Section, General Staff, Directorate of Military Survey, War Office, London, England, December 1943

"Notes on G.S.G.S. Maps of Italy, Sicily, Sardinia, and Corsica," Geographical Section, General Staff, Directorate of Military Survey, War Office, London, England, 1 May 1943

(Note: The following group of numbered volumes constitutes British Restricted Documents of the classes "Most Secret, Secret, Confidential and Restricted." Read "B. R." before each of the items for correct reference.)

493, "Jugoslavia," Geographical Handbook, Naval Intelligence Division, Royal Navy, Jarrold and Sons, Ltd., The Empire Press, Norwich, 1944

501, "Norway," Geographical Handbook, Naval Intelligence Division, Royal Navy, Oxford University, 1942

502, "Spain and Portugal," Geographical Handbook, Naval Intelligence Division, Royal Navy, Oxford University, 1941

503, "France," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, 1942

505, "Algeria," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1944

506, "Morocco," Geographical Handbook, Naval Intelligence Division, Royal Navy, Oxford University, 1941

507, "Turkey," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1943

508, "Corsica," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, 1942

509, "Denmark," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, 1944

510, "Indo-China," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, 1943

512, "French West Africa," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1943

513, "Syria," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1943

514, "Palestine and Transjordan," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1943

515, "French Equatorial Africa," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1942

516, "Greece," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, 1944

517, "Italy," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1944

518, "Netherlands East Indies," Geographical Handbook, Naval Intelligence Division, Royal Navy, C. Tinling & Co. Ltd., London, Liverpool and Prescot, 1944

519, "Pacific Islands," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, 1943

521, "Belgium," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Cambridge, and Jarrold and Sons, Ltd., The Empire Press, Norwich

522, "The Belgian Congo," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1944

523, "Tunisia," Geographical Handbook, Naval Intelligence Division, Royal Navy, University Press, Oxford, 1945

528, "Luxembourg," Geographical Handbook, Naval Intelligence Division, Royal Navy, Love & Malcomson, Ltd., Redhill, Surrey, 1944

529, "Germany," Geographical Handbook, Naval Intelligence Division, Royal Navy, Keliher, Hudson & Kearns, Ltd., London, 1944

530, "China Proper," Geographical Handbook, Naval Intelligence Division, Royal Navy, Keliher, Hudson & Kearns, Ltd., London, 1944

"Fenno-Skandien Planheft, Norwegen, Schweden, Finnland, Karelien, Kola," Oberkommando des Heeres, GenStdH/KrKartVerm Chef (IIIb), Nr.1804/44g, Berlin, 19 August 1944

"Planheftübersichten Mittelmeergebiet," Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres, bearbeitet von der Heeresplankammer, Berlin, 1941

"Planheft Osteuropa, Baltischer Raum," Oberkommando des Heeres, GenStdH/KrKartVerm Chef (IIIb), Nr.4186/44, Berlin, 14 June 1944

"Planheft Osteuropa, ehemals Polnischer Raum," Oberkommando des Heeres, GenStdH/KrKartVerm Chef (IIIb), Nr.4939/44, Berlin, 26 July 1944

"Planheft Spanien und Portugal und Strasse von Gibraltar," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, Berlin 1941

"Planheft Spanien und Portugal," Oberkommando des Heeres, GenStdH/KrKVerm Chef, Abt.f.Kr.Kart.u.Verm.Wes.,Nr.7270/43, Berlin, 28 September 1943

"Planheft Dänemark (einschl. Island, Färöer, und Grönland)," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres, bearbeitet von der Heeresplankammer, Nr.9613/42, Berlin, 1 December 1942

"Planheft Übersichten Ost," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, 2 Auflage, Berlin, 1 June 1941

"Planheft Vorderasien," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, Berlin, 1 September 1942

"Planheft Übersichten West," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, Berlin, 25 August 1942

"Planheft Afrika," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, Berlin, 1 January 1941

"Planheft Grossdeutschen Reich," Überblik über die Landesvermessung und Kartenwerke Mit einem Beiheft Anlagen. Herausgegeben vom Reichsministerium des Innern. Bearbeitet

unter Mitwirkung der Hauptvermessungsabteilungen und des Landesvermessungsamtes Böhmen und Mähren vom Reichsamnt für Landesaufnahme, Berlin, July, 1944

"Planheft Frankreich," 3 ausgabe Oberkommando des Heeres, GenStdH/KrKuVermChef, AbtKrKuVermW, Nr.20/44, Berlin, 3 January 1944

"Planheft Frankreich und Fransösisch-Nordafrika," Oberkommando des Heeres, GenStdH/KrKu-VermChef, AbtKrKuVermW.,Nr.70/43, Berlin, 5 January 1943

"Planheft Grossbritannien," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, Berlin, 1 February 1940

"Planheft Luxemburg," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres bearbeitet von der Heeresplankammer, Berlin, 1 April 1940

"Planheft Neiderlande," Oberkommando des Heeres, GenStdH/KrKVermChef, Abt.f.KrKu-VermW (IIIb) Nr. 8452/43 II, Berlin, 6 December 1943

"Planheft Italien," Oberkommando des Heeres, GenStdH/KrKVermChef, (IIIb), Nr.5640/44, Berlin, 19 August 1944 (revised to October 1944)

"Planheft Russland," Im Auftrage der Abteilung für Kriegskarten und Vermessungswesen im Generalstab des Heeres Bearbeitet von der Heeresplankammer, 2 ausgabe, Berlin, 1 September 1942

"Planheft Südosteuropa Nördlicher Teil," Entwurf, Oberkommando des Heeres, GenStdH/Kr KVermChef, Az:45c 1010, AbtfKrKartuVermW (III) 321/44, Berlin, 14 January 1944

"Planheft Südosteuropa Südlicher Teil," Entwurf, Oberkommando des Heeres, GenStdH/KrK-VermChef, AbtfKrKuVermW (III), Berlin, 1 August 1943

"Planheft Übersichten West," Oberkommando des Heeres, GenStdH/KrKartVermChef (IIIb), Nr.1696/44g, Berlin, 9 August 1944, Geheim

"Landerweise Zusammerstellung aller Karten und Mil-Geo-Arbeiten," Oberkommando des Heeres, Gen.Std.H/KrKVermChef., Abt.f.Kr.Kart.u.Verm.Chef.Abt.f.Kr.Kart.u.Verm.Wes., Berlin, 10 July 1943, Geheim

APPENDIX II

Editor's note: To exemplify the proposed cataloging procedures, the first two orders of filing divisions are reproduced herewith and occasional selections from the third category. The complete list includes some 2300 items in the tertiary group alone, exceeding the space available in this publication. If response indicates that the complete list would prove helpful to curators of map collections, effort will be made to release the material in its entirety at some later time, perhaps in mimeograph or multigraph form.

Primary Region I

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
DENMARK	(D)	Aabenraa	(a)
(From Geographical Handbook,		Aalborg	(aa)
B.R.509, NID 5, R.N., 1944)		Aarhus	(aar)
		Assens	(as)
		Bornholm	(b)
		Faroe Islands	(fi)
		Fünen	(f)
		Haderslev	(h)
		Hjörring	(hj)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(DENMARK)	(D)	Holbaek	(ho)
		Jutland	(j)
		Kobenhaven	(k)
		Maribo	(m)
		Odense	(o)
		Praesto	(p)
		Randers	(r)
		Ribe	(ri)
		Ringköbing	(rin)
		Roskilde	(ro)
		Skanderborg	(s)
		Sönderborg	(so)
		Sorö	(sor)
		Svendborg	(sv)
		Tisted	(t)
		Tönder	(to)
		Vejle	(v)
		Viborg	(vi)
		Zealand	(z)
FINLAND	(F)		
ISLANDS OF THE SEA	(IS)		
NORWAY	(N)		
SWEDEN	(S)		
THE SEA	(TS)		

Primary Region II

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ENGLAND	(E)		
IRELAND (EIRE)	(I)		
ISLE OF MAN and CHANNEL ISLANDS (From Statesman's Yearbook, 1946)	(IMC)	Alderney	(a)
		Brechou	(b)
		Guernsey	(g)
		Herm	(h)
		Isle of Man	(im)
		Jersey	(j)
		Jethou	(je)
		Lihou	(l)
		Sark	(s)
NORTH IRELAND	(NI)		
SCOTLAND	(S)		
THE SEA	(TS)		
WALES (From Statesman's Yearbook, 1946)	(W)	Anglesey	(a)
		Brecknockshire	(b)
		Caernarvonshire	(c)
		Cardiganshire	(ca)
		Carmarthenshire	(car)
		Denbighshire	(d)
		Flintshire	(f)
		Glamorganshire	(g)
		Merionethshire	(m)
		Montgomeryshire	(mo)
		Pembrokeshire	(p)
		Radnorshire	(r)

Primary Region III

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
AUSTRIA	(A)		
BELGIUM	(B)		
CZECHOSLOVAKIA	(C)		
DANZIG	(D)		
ESTONIA	(E)		
FRANCE	(F)		
GERMANY	(G)		
HUNGARY	(H)	Abaúj Torna	(at)
(From Department of State)		Bács-Bodrog	(bb)
		Baranya	(b)
		Békés	(be)
		Bihar	(bi)
		Borsod, Gömör és Kishont	(bgk)
		Csanád, Arad és Torontál	(cat)
		Czongrád	(c)
		Fejér	(f)
		Györ, Moson és Poszony	(gmp)
		Hajdu	(h)
		Heves	(he)
		Jasz-Nagykun-Szolnok	(jns)
		Komáron és Esztergom	(ke)
		Nógrad és Hont	(nh)
		Pest-Pilis-Solt-Kiskun	(psk)
		Somogy	(s)
		Sopron	(so)
		Szabolcs és Ung	(su)
		Szatmár, Ugocsa és Bereg	(sub)
		Tolna	(t)
		Vas	(v)
		Veszprém	(ve)
		Zala	(z)
		Zemplen	(ze)
LATVIA	(L)		
LIECHTENSTEIN	(LI)		
LITHUANIA	(LIT)		
LUXEMBURG	(LU)		
NETHERLANDS	(N)		
POLAND	(P)		
RUMANIA	(R)		
SWITZERLAND	(S)		

Primary Region IV

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ALBANIA	(A)		
ALGERIA	(AL)		
ANDORRA	(AN)		
ANGLO-EGYPTIAN SUDAN	(AES)		
BRITISH SOMALILAND	(BS)		
BULGARIA	(B)		
EGYPT	(E)		
ETHIOPIA	(ET)		
FRENCH SOMALILAND	(FS)		
GREECE	(G)		

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ISLANDS OF THE SEA	(IS)	British Possessions	(bp)
		French Possessions	(fp)
		Greek Possessions	(gp)
		Spanish Possessions	(sp)
		Turkish Possessions	(tp)
ITALIAN EAST AFRICA	(IEA)		
ITALY	(I)		
LEBANON (From NID5, BR 513, 1943)	(L)	Bekaa	(b)
		Lebanon Mountain	(lm)
		North Lebanon	(nl)
		South Lebanon	(sl)
LIBYA	(LI)		
THE MEDITERRANEAN	(M)	Gulfs	
		Adalia	(ga)
		Alexandrette	(gal)
		Gabes	(gg)
		Genova	(gge)
		Hammamet	(gh)
		Lions	(gl)
		Sydra	(gs)
		Taranto	(gt)
		Venice	(gv)
		Seas	
		Adriatic	(as)
		Aegean	(aes)
		Ionian	(is)
		Ligurian	(ls)
		Marmara	(ms)
		Straits	
		Bosporus	(sb)
		Dardanelles	(sd)
		Gibraltar	(sg)
		Messina	(sm)
		Bonifacio	(sbo)
		Otranto	(so)
MONACO	(MO)		
MOROCCO	(MOR)		
PALESTINE	(PA)		
PORTUGAL	(PO)		
THE RED SEA	(RS)	Red Sea	(rs)
		Suez Canal	(sc)
ROME, SEE	(ROS)		
SAN MARINO	(SM)		
SPAIN	(S)		
SPANISH SAHARA	(SS)		
SYRIA	(SY)		
TRANSJORDAN	(T)		
TUNISIA	(TU)		
TURKEY	(TUR)		
YUGOSLAVIA	(Y)		

Primary Region V

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ANGOLA	(A)		
BASUTOLAND	(B)		
BELGIAN CONGO	(BC)		
BECHUANALAND PROTECTORATE	(BP)		
BRITISH CAMEROONS	(BC)		
FRENCH EQUATORIAL AFRICA	(FEA)		
FRENCH WEST AFRICA	(FWA)		
GAMBIA	(G)		
GOLD COAST	(GC)		
KENYA COLONY AND PROTECTORATE	(KC)		
LIBERIA (From Hanson, Earl P., "An Economic Survey of the Western Province of Liberia," *Geog. Rev.*, Vol. XXXVII, No. 1 (Jan. 1947), pp. 53–69)	(L)	Central Province Eastern Province Western Province	(cp) (ep) (wp)
MOZAMBIQUE	(M)		
NIGERIA	(N)		
NYASALAND PROTECTORATE	(NYP)		
PORTUGUESE GUINEA	(PG)		
NORTHERN RHODESIA	(NR)		
SOUTHERN RHODESIA	(SR)		
RUANDA-URUNDI	(RU)		
SIERRA LEONE	(SL)		
SOUTHWEST AFRICA	(SA)		
SWAZILAND	(S)		
TANGANYIKA	(T)		
UGANDA PROTECTORATE	(UP)		
UNION OF SOUTH AFRICA	(USA)		
ZANZIBAR	(Z)		

Primary Region VI

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ARMENIAN SOVIET SOCIALIST REPUBLIC	(ARR)		
AZERBAIDZAHN SOVIET SOCIALIST REPUBLIC	(ASR)		
BELORUSSIAN SOVIET SOCIALIST REPUBLIC	(BSR)		
ESTONIAN SOVIET SOCIALIST REPUBLIC	(ESR)	(See Lithuanian S.S.R., p. 28)	
GEORGIAN SOVIET SOCIALIST REPUBLIC	(GSR)		
ISLANDS OF THE SEA	(IS)	Begichev Island Karagin Island Kolguev Island Kuzkii Island Little Taimir Island Lyakov Islands	(bi) (ki) (koi) (kui) (lti) (li)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(ISLANDS OF THE SEA)	(IS)	Medvezhi Island	(mi)
		New Siberian Islands	(nsi)
		Novaya Zemlya Island	(nzi)
		Severnaya Zemlya	(szi)
		Shantar Island	(si)
		Stolovoi Island	(sti)
		Uedineniya Island	(ui)
		Vaigach Island	(vi)
		Vilkitskogo Island	(vii)
		Wrangel Island	(wi)
KARELO-FINNISH SOVIET SOCIALIST REPUBLIC	(KFR)		
KAZAKH SOVIET SOCIALIST REPUBLIC	(KSR)		
KIRGIZ SOVIET SOCIALIST REPUBLIC	(KRR)		
LATVIAN SOVIET SOCIALIST REPUBLIC	(LRR)	(See Lithuanian S.S.R., below)	
LITHUANIAN SOVIET SOCIALIST REPUBLIC	(LSR)	File with Lithuania pending recognition of territorial change by the United States	
MOLDAVIAN SOVIET SOCIALIST REPUBLIC	(MSR)		
RUSSIAN SOVIET FEDERATED SOCIALIST REPUBLIC	(RFR)		
SEAS AND GULFS	(SG)	Barents Sea	(bs)
		Black Sea	(bls)
		Caspian Sea	(cs)
		Kara Sea	(ks)
		Nordenskjöld Sea	(ns)
		Sea of Okhotsk	(os)
		White Sea	(ws)
		Gulf of Anadir	(ag)
TADZHIK SOVIET SOCIALIST REPUBLIC	(TSR)		
TURKMEN SOVIET SOCIALIST REPUBLIC	(TSR)		
UKRAINIAN SOVIET SOCIALIST REPUBLIC (From Shabad, Theodore, "Political-Administrative Divisions of the USSR, 1945," *Geog. Rev.*, Vol. XXXVI, No. 2 (April 1946), pp. 303–11)	(USR)	Chernigov	(co)
		Chernovtsy	(cho)
		Dneproptrovsk	(do)
		Drogobych	(dro)
		Izmail	(io)
		Kamenets-Podolski	(kpo)
		Kharkov	(ko)
		Kherson	(kho)
		Kiev	(kio)
		Kirovograd	(kro)
		Lvov	(lo)
		Nikolayev	(no)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(UKRAINIAN S.S.R.)	(USR)	Odessa	(oo)
		Poltava	(po)
		Rovno	(ro)
		Stalino	(so)
		Stanislav	(sto)
		Sumy	(suo)
		Ternopol	(to)
		Vinnitsa	(vo)
		Volyn	(voo)
		Voroshilovgrad	(vro)
		Zakarpatskaya	(zo)
		Zaporozhye	(zao)
		Zhitomir	(zho)
UZBEK SOVIET SOCIALIST REPUBLIC	(USR)		

Primary Region VII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
CHINA	(C)		
JAPAN	(J)		
KOREA	(K)	Cholla-Namdo	(cn)
(From Joint Army-Navy Intelligence Study)		Cholla-Pukto	(cp)
		Ch'ungch'ong-Namdo	(chn)
		Ch'ungch'ong-Pukto	(chp)
		Hamgyong-Namdo	(hn)
		Hamgyong-Pukto	(hp)
		Hwanghae-Do	(hd)
		Kangwon-Do	(kd)
		Kongsang-Namdo	(kn)
		Kongsang-Pukto	(kp)
		Kyonggi-Do	(kyd)
		Pyongan-Namdo	(pn)
		Pyongan-Pukto	(pp)
MANCHURIA	(M)		
MONGOLIA	(MO)		
OUTER MONGOLIA	(OM)		
SIN-KIANG	(SK)		
TANNU-TUVA	(TT)		
TIBET	(T)		

Primary Region VIII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
INDO-CHINA	(IC)		
INDONESIA	(I)	Anambas Archipelago	(aa)
(From Statesman's Yearbook and Atlas Van Tropisch Nederland)		Bali Island	(bi)
		Bangka	(b)
		Billiton	(bil)
		Borneo	(bo)
		Borneo East District	(be)
		Borneo South District	(bs)
		Borneo West District	(bw)
		Brunei	(br)
		Ceram Islands	(ci)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(INDONESIA)	(I)	Gulf of Siam	(gs)
		Halmahera Island	(hi)
		Island of Celebes	(ic)
		Java and Madura	(jm)
		Lombock Island	(li)
		Karimata Islands	(ki)
		Mentawai Islands	(mi)
		Natoena Archipelago	(na)
		North Borneo	(nb)
		Riau Lingga Archipelago	(rla)
		Sarawak	(s)
		Soemba Island	(si)
		Straits of Macassar	(sm)
		Straits of Malacca	(sma)
		Sumatra	(su)
		Tambelan Islands	(ti)
		Islands of the Andaman Sea	(ian)
		Islands of the Arafura Sea	(ia)
		Islands of the Banda Sea	(ib)
		Islands of the Celebes Sea	(ice)
		Islands of the Ceram Sea	(icr)
		Islands of the Flores Sea	(if)
		Islands of the Halmahera Sea	(ih)
		Islands of the Java Sea	(ij)
		Islands of the Macassar Sea	(ims)
		Islands of the Molucca Sea	(im)
		Islands of the Sawoe Sea	(is)
		Islands of the Timor Sea	(it)
MALAYA	(M)		
THAILAND	(T)		

Primary Region IX

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
AFGHANISTAN	(A)		
ARABIA	(AR)		
BURMA	(B)		
INDIA	(I)	Bhutan	(b)
		Ceylon	(c)
		Dominion of India	(di)
		Dominion of Pakistan	(dp)
		French India	(fi)
		Nepal	(n)
		Portuguese India	(pi)
		Princely States	(ps)
IRAQ	(IR)		
ISLANDS OF THE SEA	(IS)		
PERSIA	(P)		
SEAS, OCEANS, AND GULFS	(SG)	Aden, Gulf	(ag)
		Oman, Gulf	(og)
		Persian Gulf	(pg)

Primary Region X

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ARGENTINA (From AGS Civil Divisions Base Map of the Americas, 1 : 5,000,000, 1944)	(A)	Buenos Aires	(ba)
		Capital Federal	(cf)
		Catamarca	(c)
		Chaco	(ch)
		Chubut	(chu)
		Córdoba	(co)
		Corrientes	(cor)
		Entre Ríos	(er)
		Formosa	(f)
		Jujuy	(j)
		La Pampa	(lp)
		La Rioja	(lr)
		Mendoza	(m)
		Misiones	(mi)
		Neuquén	(n)
		Río Negro	(rn)
		Salta	(s)
		San Juan	(sj)
		San Luís	(sl)
		Santa Cruz	(sc)
		Santa Fé	(sf)
		Santiago del Estero	(se)
		Tierra del Fuego	(tf)
		Tucumán	(t)
CHILE	(C)		
URUGUAY	(U)		

Primary Region XI

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
BOLIVIA (From AGS Civil Divisions Base Map of the Americas, 1 : 5,000,000, 1944)	(B)	Beni	(b)
		Chuquisaca	(c)
		Cochabamba	(co)
		La Paz	(lp)
		Oruro	(o)
		Pando	(p)
		Potosí	(po)
		Santa Cruz	(sc)
		Tarija	(t)
BRAZIL	(BR)		
BRITISH GUIANA	(BG)		
COLOMBIA	(C)		
ECUADOR	(E)		
FRENCH GUIANA	(FG)		
PARAGUAY	(P)		
PERU	(PE)		
SURINAM	(S)		
VENEZUELA	(V)		

Primary Region XII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
BAHAMA ISLANDS (From Statesman's Yearbook, 1946)	(BI)	Abaco	(a)
		Acklin's Island	(ai)
		Andros Island	(ani)
		Cat Island	(ci)
		Crooked Island	(cri)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(BAHAMA ISLANDS)	(BI)	Eleuthera	(e)
		Exuma	(ex)
		Grand Bahama	(gb)
		Great Inagua	(gi)
		Harbour Island	(hi)
		Lesser Islands of the Group	(lig)
		Long Island	(li)
		Mayaguana	(m)
		New Providence	(np)
		San Salvador	(ss)
BRITISH HONDURAS (From AGS Civil Divisions Base Map of the Americas, 1 : 5,000,000, 1944)	(BH)	Belize	(b)
		Cayo	(c)
		Northern	(n)
		Stann Creek	(sc)
		Toledo	(t)
COSTA RICA	(CR)		
CUBA	(C)		
EL SALVADOR	(ES)		
GUATEMALA	(G)		
HISPANIOLA	(H)		
HONDURAS	(HO)		
JAMAICA	(J)		
LESSER ANTILLES (From Statesman's Yearbook, 1946)	(LA)	Antigua	(a)
		Barbados	(b)
		Barbuda and Redonda	(br)
		Dominica	(d)
		Grenada	(g)
		Lesser Islands of the Group	(lig)
		Martinique	(m)
		St. Croix	(sc)
		St. Kitts	(sk)
		St. Lucia	(sl)
		St. Thomas	(st)
		St. Vincent	(sv)
MEXICO	(M)		
NETHERLANDS WEST INDIES	(NWI)		
NICARAGUA	(N)		
PANAMA	(P)		
PUERTO RICO	(PR)		
TRINIDAD AND TOBAGO	(TT)		

Primary Region XIII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ARIZONA (From Rand McNally World Atlas, 1936)	(AR)	Apache	(a)
		Cochise	(c)
		Coconino	(co)
		Gila	(g)
		Graham	(gr)
		Greenlee	(gre)
		Maricopa	(m)
		Mohave	(mo)
		Navajo	(n)
		Pima	(p)
		Pinal	(pi)
		Santa Cruz	(sc)
		Yavapai	(y)
		Yuma	(yu)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
THE GREAT LAKES	(GL)	Islands of the Great Lakes	(igl)
		Lake Erie	(le)
		Lake Huron	(lh)
		Lake Michigan	(lm)
		Lake Ontario	(lo)
		Lake St. Clair	(lsc)
		Lake Superior	(ls)

Primary Region XIV

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
FIRST JUDICIAL DISTRICT	(FJD)		
SECOND JUDICIAL DISTRICT	(SJD)		
THIRD JUDICIAL DISTRICT	(TJD)		
FOURTH JUDICIAL DISTRICT	(FOJD)		

Primary Region XV

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ALBERTA	(A)	Acadia	(a)
(From Rand McNally		Athabaska	(at)
World Atlas, 1936)		Battle River	(br)
		Bow River	(bor)
		Calgary East	(ce)
		Calgary West	(cw)
		Camrose	(c)
		Edmonton	(e)
		Lethbridge	(l)
		Macleod	(m)
		Medicine Hat	(mh)
		Peace River	(pr)
		Red Deer	(rd)
		Vegreville	(v)
		Wetaskiwin	(w)
BRITISH COLUMBIA	(BC)		
MANITOBA	(M)		
NEW BRUNSWICK	(NB)		
NEWFOUNDLAND	(N)		
NORTHWEST TERRITORIES	(NWT)	District of Keewatin	(dk)
(Same source as above)		District of Mackenzie	(dm)
		District of Yukon	(dy)
		Islands of the Canadian Arctic	(ica)
		Islands of Hudson Bay	(ihb)
NOVA SCOTIA	(NS)		
ONTARIO	(O)		
PRINCE EDWARD ISLAND	(PEI)		
QUEBEC	(Q)		
SASKATCHEWAN	(S)		

Primary Region XVI

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
AZORES ISLANDS	(AI)	Corvo	(c)
(From Rand McNally World		Fayal Island	(fi)
Atlas, 1936; Stielers Handatlas,		Flores Island	(fli)
1944; Geog. Handbook, NID5,		Graciosa Island	(gi)
BR 502, 1945)		Pico Island	(pi)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(AZORES ISLANDS)	(AI)	São Jorge Island	(sji)
		São Miguel Island	(smi)
		Sta. Maria Island	(sti)
		Terceira Island	(ti)
		Lesser Islands of the Group	(lig)
BERMUDA ISLANDS	(BI)		
CANARY ISLANDS	(CI)		
CAPE VERDE ISLANDS	(CVI)		
FAEROE ISLANDS	(FI)		
ICELAND	(I)		
MADEIRA ISLANDS	(MI)		
OUTLYING ISLANDS	(OI)	Classify alphabetically as necessary	

Primary Region XVII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ISLANDS OF THE SEA (From Rand McNally World Atlas 1936, and Stieler's Handatlas, 1944)	(IS)	Ascension Island	(ai)
		Bouvet Island	(bi)
		Falkland Islands	(fi)
		Gough Island	(gi)
		Sandwich Group	(sg)
		South Georgia	(sog)
		South Orkney Islands	(soi)
		St. Helena	(sh)
		St. Paul's Rocks	(spr)
		Trinidad Island	(ti)
		Tristan da Cunha	(tc)
		Lesser Islands of the Sea	(lis)
SOUTH ATLANTIC OCEAN	(SAO)		

Primary Region XVIII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ALEUTIAN ISLANDS	(AI)		
BERING SEA ISLANDS	(BSI)		
HAWAIIAN ISLANDS	(HI)		
NORTHERN MICRONESIA	(NM)		
NORTHERN POLYNESIAN ISLANDS	(NPI)		
OUTLYING ISLANDS (From Stieler's Handatlas, 1944; Rand McNally World Atlas, 1936)	(OI)	Clipperton Island	(ci)
		Cocos Islands	(coi)
		Guadelupe Island	(gi)
		Islands of the American Coast	(iac)
		Malpelo Island	(mi)
		Revilla Gigedo Islands	(rgi)
		Lesser Islands of the Group	(lig)
PHILIPPINE ISLANDS	(PI)		
WESTERN ISLANDS	(WI)	Formosa Island	(fi)
		Kurile Islands	(ki)
		Marcus Island	(mi)
		Ogasawara Island	(oi)
		Ryukyu Islands	(ri)
		Wake Island	(wi)

Primary Region XIX

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
AUSTRALIA	(A)		
MELANESIA (From Statesman's Yearbook, 1946; Stieler's Handatlas, 1944; Geographical Handbook, NID5, BR 519A, 1943)	(M)	Bismarck Archipelago	(ba)
		Louisiade Archipelago	(la)
		Loyalty Islands	(li)
		New Caledonia	(nc)
		New Hebrides Islands	(nhi)
		Santa Cruz Islands	(sci)
		Solomon Islands	(si)
		Viti Islands	(vi)
NEW GUINEA	(NG)		
NEW ZEALAND	(NZ)		
OUTLYING ISLANDS (Same sources as above)	(OI)	Ducie Island	(di)
		Easter Island	(ei)
		Galapagos Islands	(gi)
		Henderson Island	(hi)
		Juan Fernandez	(jf)
		Oeno Island	(oi)
		Pitcairn Group	(pg)
		Sala y Gomez Island	(sgi)
		San Felix and San Ambrosio Islands	(sai)
SAMOA	(S)		
SOUTHERN MICRONESIA	(SM)		
SOUTHERN POLYNESIA	(SP)		

Primary Region XX

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ANDEMAN ISLANDS	(AI)		
ISLANDS OF THE ARABIAN SEA	(IAS)		
ISLANDS OF THE INDIAN OCEAN (From Stieler's Handatlas, 1944; Atlas des Colonies Françaises, Paris, 1934; Rand McNally World Atlas, 1936)	(IIO)	Albatross Island	(ai)
		Aldabara Island	(ali)
		Amaranti Island	(ami)
		Chagos Island	(ci)
		Christmas Island	(chi)
		Cocos Islands	(coi)
		Comoro Islands	(cmi)
		Cosmoledo Island	(csi)
		Crozby Island	(cri)
		Glorious Islands	(gi)
		Heard Island	(hi)
		Kerguelen Island	(ki)
		Lesser Islands of the Sea	(lis)
		Marion Island	(mi)
		Mauritius Island	(mai)
		New Amsterdam Island	(nai)
		Prince Edward Island	(pei)
		Rodrigues Island	(ri)
MADAGASCAR (From Atlas des Colonies Françaises, Paris, 1934)	(M)	Akinankaratra	(ap)
		Analava	(anp)
		Betroka	(bp)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(MADAGASCAR)	(M)	D'Ambositra	(dap)
		Diego-Suarez	(dsp)
		Farafangana	(fp)
		Fiararantsoa	(fip)
		Fort-Dauphin	(fdp)
		L'Itasy	(lip)
		Maevatanana	(mp)
		Maintirano	(map)
		Majunga	(mjp)
		Mananjary	(mnp)
		Maroantsetra	(mrp)
		Moramanga	(mop)
		Morondava	(mdp)
		Nossi-Be	(nbp)
		Tamatave	(tp)
		Tananarive	(tap)
		Tulear	(tup)
NICKOBAR ISLANDS	(NI)		

Primary Region XXI

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
DE LONG ISLANDS	(DLI)		
FRANZ JOSEPH LAND	(FJL)		
GREENLAND	(G)		
OUTLYING ISLANDS (From Stieler's Handatlas, 1944; Rand McNally World Atlas, 1936)	(OI)	Barren Island	(bi)
		Bean Island	(bei)
		Herald Island	(hi)
		Jan Mayen Island	(jmi)
		Kessel Island	(ki)
		Kotelnyi Island	(koi)
		Lesser Outlying Islands	(loi)
		Nordenskjöld Archipelago	(na)
		Northern Land	(nl)
		Plover Island	(pi)
		Uedinenya Island	(ui)
SVALBARD	(S)		

Primary Region XXII

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
ANTARCTIC CONTINENT (From Stieler's Handatlas, 1944; Rand McNally World Atlas, 1936; Antarctica 1:10,000,000, Property and Survey Branch, Dept. of Interior, Canberra, Australia, 1939; L. M. Gould)	(AC)	Argentinian Claims	(ac)
		Australian Dependency	(ad)
		Chilean Claims	(cc)
		Falkland Islands Dependency	(fid)
		French Claims	(fc)
		James W. Ellsworthland	(jel)
		Marie Byrd Land	(mbl)
		Norwegian Claims	(nc)
		Queen Maud Land	(qml)
		Ross Dependency	(rd)
ANTARCTIC SEAS (Same sources as above)	(AS)	Amundsen Sea	(as)
		Bellinghausen Sea	(bs)
		King Haakon VII Sea	(khs)

Secondary Filing Divisions	*Code*	*Tertiary Filing Divisions*	*Code*
(ANTARCTIC SEAS)	(AS)	Ross Sea	(rs)
		Weddell Sea	(ws)
OUTLYING ISLANDS	(OI)	Antipodes Islands	(ai)
(Same sources as above)		Auckland Island	(aui)
		Balleny Island	(bi)
		Buckle Island	(bui)
		Campbell Island	(ci)
		Gribb Bank	(gb)
		Macquarie Island	(mi)
		Maude Bank	(mai)
		Peter I Island	(pi)
		Royal Company Island	(rci)
		Sturge Island	(si)
		Scott Island	(sci)
		Young Island	(yi)
SOUTH SHETLAND ISLANDS	(SSI)	Biscoe Island	(bi)
(Same sources as above)		Clarence Island	(ci)
		Elephant Island	(ei)
		James Ross Island	(jri)
		Joinville Island	(ji)
		Lesser Islands of the Group	(lig)
		North Graham Island	(ngi)

FIG. 2. Division of the world into "Primary Regions." Design and Construction by John Kofler.

ELLSWORTH HUNTINGTON

MEMOIR TO ELLSWORTH HUNTINGTON, 1876–1947

S. S. VISHER

Few geographers or other scientists have left as wide and provocative an impress on the world's thought about the world as has Ellsworth Huntington. The scale of his work was large and bold. His was the "search for broad interrelationships, for tendencies, for a world view," and a seeking for the "architectural unity" of the world's structure. Huntington's eagerness to share his findings with others, his indefatigable energy, and a superlative facility for written communication gave him an audience almost as far-reaching as the scope of his work. Several of his volumes have been translated into other languages, and something of his work was known to the intelligentsia of all countries.

Ellsworth Huntington was born in a parsonage in Galesburg, Illinois, on September 16, 1876. He attended high school in Maine and Massachusetts, and college at Beloit, Wisconsin, from where he was graduated in 1897.

His adult life may be roughly divided into four periods: from 1896 to 1905, his work was largely in geology. While attending Beloit, he spent a summer in the field for the Wisconsin Geological Survey, and his first paper (1897) was judged a substantial contribution. Upon graduation he became an instructor in Euphrates College, Harput, Turkey, remaining there until 1901. His summer vacations were filled with field studies, including the first scientific exploration of the canyons of the Euphrates River. He left Asia Minor in 1901 to study two years at Harvard, largely under William Morris Davis. At Davis' recommendation, Andrew Carnegie financed Huntington in nearly two years of exploration in Turkestan and Persia with the Pumpelly Expedition.

Early in his professional career Huntington evidenced an interest in climate. While 23 years of age, he wrote two studies which were published in *The Monthly Weather Review;* and his observations of the influence of climate in western and central Asia soon made this his chief interest.

From 1905 to 1922, Huntington concentrated on climate and weather and their influences. His orderly mind and his concern for pervading patterns responded to the challenge of the big theme represented by climate.

At the beginning of this second period of his professional life, another Asian expedition, about 18 months long, in 1905–06, took Huntington to India and Tibet, from where he returned by way of Siberia and Russia. This trip was financed by a Harvard classmate, Robert Barrett. *The Pulse of Asia* (1907) resulted, and aroused widespread interest. It gave rise to the "Huntington Theory," that there have been considerable changes of climate and that these changes have profoundly influenced the history and nature of civilization. A chapter of this book was accepted as his Ph.D. thesis at Yale, and he became a faculty member there, to begin an association that continued until his death.

In 1909, Huntington returned again to the Middle East, on an eight-months' expedition to the Syrian Desert and Palestine—an expedition partly financed by *Harper's* magazine. *Palestine and Its Transformation* (1911) embodied results of this work. From 1910 to 1913, he supplemented work initiated in the summer between his student years at Harvard. This work took him into southwestern United States, Mexico, and Central America, where his later researches were concerned chiefly with archeological ruins and with interpreting the story of past climates through studies of tree rings. His tree-ring studies supplemented those initiated by the distinguished astronomer, A. E. Douglass of the University of Arizona. Huntington's writings greatly stimulated interest in tree-ring studies, and contributed to expanded opportunities in this field. The southwestern studies resulted in *The Climatic Factor as Illustrated in Arid America* (1914). This book was soon followed by the classic, *Civilization and Climate* (1915). Near the close of this period came *Climatic Changes, Their Nature and Causes* (1922), and *Earth and Sun* (1923).

During 1919, shortly before the death of S. W. Cushing, Huntington began his textbook writing with *The Principles of Human Geography*, 1920. Despite the steady volume of Huntington's original work, he wrote and revised a series of textbooks, each of which afforded freshness of approach, educationally valuable contributions and considerable popular interest, as well as pleasure and profit to students.

In the third period of Huntington's work, 1923–1928, he emphasized the great influences on civilization of selective migration, selective survival, and intermarriage among culturally homogeneous groups. His presidential address (1923) before the Association of American Geographers (of which he was a charter member) keynoted the theme of selective influences, and in *The Character of Races* (1924), he made it a permanent part of the world's literature.

In 1923, Huntington extended his already extensive firsthand observations of the world. He was appointed an official delegate to the Pan-Pacific Scientific Congress in Australia. He spent weeks en route in Japan, Korea, China and Java, and traveled widely in Australia. His observations were summarized in *West of the Pacific* (1925); this and *Palestine and Its Transformation* are considered by many as gems of descriptive geography. Other observations found their way into *The Human Habitat* (1927), in which are found some of the most fascinating, clearly reasoned, short papers in geography.

Although the last period of Huntington's life (1928–1947) was marked by several new interests, it can appropriately be called a period of consolidation. He completed his foreign travels in 1928–30, using textbook royalties for the purpose. He traversed North Africa, going as far south as the equator. He traveled more than 10,000 miles in Europe by automobile, and visited the chief regions and cities of South America.

His interest in eugenics led to two books in this field. Concerning his *Season of Birth* (1938), the editor of the *Journal of the American Medical Association* stated:

"This remarkable book is one of fundamental importance in human biology and should be read by every physician." Huntington also indicated interests in the League of Nations and cooperatives in the latter years of this period.

His major effort in consolidating his observations and knowledge was *Mainsprings of Civilization* (1945). Here he brought together and elaborated upon numerous themes in a grand attempt "to analyze the rôle of biological inheritance and physical environment in influencing the course of history." *Time* magazine (October 27, 1947) declared it second only to Arnold J. Toynbee's classic in boldness of conception, breadth of scope and erudition, and literary attractiveness. He was at work on a further effort at consolidation, *The Pace of History*, when on the evening of October 16, 1947, he succumbed to a heart attack.[1]

Huntington's contributions to theory include the following: Past climates have been characterized by significant changes which were irregular in occurrence, not simple cycles or progressive trends. Changes in the sun, he contended, are a major cause of changes in terrestrial climate. Climate has profoundly influenced man, his culture, other forms of life, and geologic processes. Even weather in its relative evanescence has, through brief and erratic changes, affected man's energy, health, and longevity, and his attitudes and achievements. The stimulating influence of weather changes (storms) was first effectively presented by him. The distribution of the various levels of civilization corresponds roughly with the climatic regions. The climate best suited to intellectual activities and progress is characterized by a well-defined seasonal pattern having frequent changes of weather and sufficient warmth and rainfall to permit extensive agricultural production. Civilization has tended to shift into cooler climates as mankind has advanced in his culture—a theory first announced by Herbert Spencer and later supported by S. C. Gilfillan and Huntington. In this movement of civilization toward colder regions, each of the chief crops and types of farm animals has improved in yield and quality (a latitudinal phenomenon apparently first observed by Huntington). Finally, selective migration and selective survival, together with intermarriage of people of relatively homogeneous cultures, have profoundly influenced the course of history.

In his effort to cover this large area of subject matter, Huntington produced an enormous volume of work. He was the author or co-author of 29 volumes, contributed chapters in 27 other books, and wrote more than 180 articles.[2] Of these latter, more than a score were in periodicals of wide circulation, attesting to his interest in reaching a popular audience and his ability to do so. He was for many persons the world's outstanding geographer. His work was known and frequently

[1] During 1918–19 he was a Captain in Military Intelligence and then Major R.O.C. He married in 1917, and his widow survives. Their younger son was killed in action in 1944 in eastern France. An older son saw service as a naval officer in the western Pacific; a daughter did Red Cross work in France and Germany in 1945 and 1946. Dr. Huntington had a severe heart attack about a year before his death, but recuperated and worked effectively until the day of his death.

[2] These publications can be roughly classified into seven fields: (1) textbooks, 9, and chapters in other textbooks, 5; (2) regional studies: books, 8, chapters in other books, 9;

cited not only by professional geographers of the world, but by many historians, sociologists, economists, agriculturalists, ecologists, climatologists, and geologists.

In the course of Huntington's work he received many honors. His textbooks and other educational writings brought him the Distinguished Service to Geography Award of the National Council of Geography Teachers. He served as president of the Association of American Geographers, of the Ecological Society of America, and of the American Eugenics Society. He was a director of the Population Society of America, and an officer in several other organizations. He was associate editor of the *Geographical Review, Ecology, Economic Geography* and *Social Philosophy.* He was starred as a distinguished geologist in "American Men of Science," 1921. Medals were awarded to him by leading British, French, and American geographical societies, and honorary doctorates by Clark University and Beloit College.

Although Yale University encouraged him to give his full time to research by making him a Research Associate (with the rank of Professor) free from classroom duties, he conducted occasional seminars and supervised the thesis work of a number of students. He taught regular classes during one or two terms at Chicago, Clark, and Harvard, and gave series of lectures at several other universities.[3]

Two of Huntington's outstanding personal traits were his great industry and unusual perseverance. He worked persistently, finding his chief satisfaction in much

articles, about 30; (3) climatic or weather studies including effects: books 9, parts of books 11, articles, about 65; (4) studies of social geography: books, 4; chapters in other books, 6; articles, about 12; (5) studies of human qualities, including eugenics: books, 5; chapters in other books, 5; articles, about 50; (6) geological studies, including climatic changes: books, 2, chapters in other books, 2; geologic articles, 8; (7) archeology: articles 10. A rough classification of the articles as to place of publication is: scholarly journals, 25 (110 articles); popular magazines, including *Scribner's, Harper's,* and *National Geographic,* 12 (35 articles); intermediate or semi-popular magazines, 25 (40 articles).

[3] The following excerpts from reviews of some of his books are of interest here:

Derwent Whittlesey, reviewing *Climatic Changes* in *Journal of Geography,* Dec., 1923: "The volume forces the reader to extend his spiritual horizon and to orient his personal philosophy afresh."

Concerning *Season of Birth,* C. E. P. Brooks stated in *Meteorological Magazine* (London, 1938): "Huntington has now proved that climate is of even greater importance with respect to birth than later in life."

Jan O. M. Broek, reviewing *Principles of Economic Geography* in *Geographical Review,* Oct., 1941: "One has to have respect for the breadth of interest, the stimulating ideas, and the interesting maps and cartograms. And, above all, there is a system behind it. Huntington is one of the few geographers who make a genuine attempt to give architectural unity to the world's economic structure. . . . I want to pay homage to an active mind. His work is not another compilation but an eminently readable creation, full of thought, [containing] little dogmatic reasoning but, on the other hand, many stimulating ideas and original maps. [It reveals] a search for broad interrelationships, for tendencies, for a world view."

Reviewing *Mainsprings of Civilization* (*Journal of Geography,* Dec., 1946) Ralph H. Brown wrote, "Huntington is a lucid writer, unsurpassed in the skill of map interpretation. Read the book or any part of it and your intellectual horizon will be very greatly enlarged." George H. T. Kimble wrote of that book (*Geographical Review,* Jan., 1946): "No other scientist has worked harder to get his opinions corroborated or been at greater pains to see the other side of the question."

work well done. Deafness increased his concentration and discouraged interruptions. His perseverance made him return repeatedly to subjects he had already investigated in order to use knowledge and insights subsequently acquired. Each time he worked on a problem, he appreciably pushed back the boundary of the unknown.

He was exceptionally kind and generous in his attitude toward fellow workers. His emphasis was always of a positive, encouraging kind; he wanted to kindle in others the desire to extend the frontiers of existing knowledge. As a consequence, for example, his numerous book reviews dwelt largely on the best features of each work, rather than on its shortcomings.

He was not, however, uncritical. This was shown in his exacting reviews of work in manuscript form. Even here, however, his summary comment was one of encouragement and stimulation. A master's thesis abstract submitted by the present writer in 1909, for example, brought from Huntington a six-page letter of suggestions for further research in the Arizona area in which he himself had worked. Since then, scores of encouraging letters and conversations have yielded hundreds of concrete, constructive suggestions. As recently as last July, he devoted many hours to a very careful reading of a long manuscript submitted to him, and made excellent suggestions for its improvement.

Huntington strove painstakingly for simplicity and clarity of style. Wishing to democratize geographic truths, he avoided esoteric jargon even in his professional monographs. His success as a writer was appreciated by many of his scientific contemporaries. "He could write clearly and simply, sometimes so simply that many were prone to underestimate the painstaking amount of research on which his conclusions were based." The following comment on one of his books applies to almost all: "Despite the depth of the subjects treated, it is not a hard book to read."

Huntington was definitely an intellectual pioneer. His bold search for the pervading unities which underlie the structure and patterns of world culture meant necessarily that often he was working with inadequate tools and scanty data. He was accused, often justly, of going "farther than the available knowledge justifies." His eagerness to arrive at the big truths, the ultimate principles that crown scientific work, was disturbing to cautious scholars. His burning desire to achieve accomplishments whose complete proof will require decades of effort by numerous workers helps to explain his unremitting industry and his back-tracking to pick up new threads of evidence. His earnest desire to learn the truth also helps explain his personal gratitude and generous acknowledgments to fellow scientists who had found new and helpful data, and his continual encouragement to the intellectual explorations of others. His was, indeed, a great accomplishment. He pointed out many of the alluring horizons in geographic and interdisciplinary research, and ably staked out some of the main roads to them.[4]

[4] Helpful suggestions were received on a preliminary sketch from Chauncy D. Harris, John K. Rose, and Victor Roterus (former students of Dr. Huntington), and from Mrs. Huntington and Otis P. Starkey. The portrait accompanying this memoir is reproduced by courtesy of the Edward Malley Company, New Haven, Connecticut.

BIBLIOGRAPHY OF THE MORE IMPORTANT WRITINGS OF ELLSWORTH HUNTINGTON

BOOKS

The Pulse of Asia, Houghton, Mifflin, Boston, 1907

Palestine and Its Transformation, Houghton, Mifflin, Boston, 1911

Asia, A Geography Reader, Rand, McNally, Chicago, 1912

The Climatic Factor as Illustrated in Arid America, Carnegie Institution of Washington, Publ. No. 192, 1915

Civilization and Climate, Yale University Press, New Haven, Conn., 1915, 1922, 1924. Spanish trans.; two Japanese trans.

The Geography of Europe (with H. E. Gregory), Yale University Press, 1918

Siberia and Eastern Russia, Military Handbook, 4 vols. (supervised), Government Printing Office, Washington, 1918

World Power and Evolution, Yale University Press, 1919

The Red Man's Continent, A Chronicle of Aboriginal America, Yale University Press, 1919

Principles of Human Geography (first edition with Sumner W. Cushing), Wiley, New York, 1920. Fifth ed., 1940. Japanese, Chinese, Spanish translations

Business Geography (with F. E. Williams), Wiley, N. Y., 1922, 1926

Climatic Changes (with S. S. Visher), Yale University Press, 1922

Earth and Sun, Yale University Press, 1923

The Character of Races, Scribner, New York, 1925

Modern Business Geography (first edition with S. W. Cushing), World Book Company, Yonkers, 1924, 1930

West of the Pacific, Scribner, New York, 1925

The Pulse of Progress, Scribner, New York, 1926

The Human Habitat, Van Nostrand, New York, 1927

Builders of America (with Leon F. Whitney), Morrow, New York, 1927

Weather and Health, A Study of Daily Mortality in New York City, National Research Council Bulletin 75, Washington, 1930

Living Geography (with C. B. Benson and F. M. McMurry), 2 vols., Macmillan, New York, 1932

Economic and Social Geography (with F. E. Williams and Samuel Van Valkenburg), Wiley, New York, 1933

After Three Centuries, Williams and Wilkins, Baltimore, 1935

Tomorrow's Children: The Goal of Eugenics, Wiley, New York, 1935

Geography of Europe (with Samuel Van Valkenburg), Wiley, New York, 1935

Season of Birth, Wiley, New York, 1938

Principles of Economic Geography, Wiley, New York, 1940

Mainsprings of Civilization, Wiley, New York, 1945

Geography of Human Affairs (with Samuel Van Valkenburg), World Book Company, Yonkers, N. Y., 1948

PARTS OF BOOKS

A Geologic and Physiographic Reconnaissance in Central Turkestan and the Basin of Eastern Persia and Sistan, in *Explorations in Turkestan, Expedition of 1903*, Raphael Pumpelly, editor; Carnegie Institution of Washington, 1905, pp. 159–216, 219–315

Description of the Kurgans of the Merv Oasis, *Explorations in Turkestan, Expedition of 1904*, Carnegie Institution of Washington, 1908, pp. 217–32

The Fluctuating Climate of North America, in *Annual Report of Smithsonian Institution, 1912;* Washington, 1913, pp. 383–412

Guatemala and the Highest Native American Civilization, in *Proceedings of the American Philosophical Society*, 52: 1913, pp. 467–87

Geographical Environment and Japanese Character, in *Japan and Japanese-American Relations* (Clark University Addresses), edited by C. H. Blakeslee; G. E. Stechert and Co., New York, 1912, 25 pp.

Adaptability of White Man to Tropical America, in *Latin America* (Clark University Addresses), Stechert, 1914, pp. 360–86

The Factor of Health in Mexican Character, in *Mexico and the Caribbean* (Clark University Addresses), Stechert, 1920, pp. 44–53

Maya Civilization and Climatic Changes, in *Proceedings of the Nineteenth International Congress of Americanists,* Washington, 1917, pp. 150–64

Solar Activity, Cyclonic Storms and Climatic Changes, in *Proceedings of the Second Pan-American Scientific Congress,* Government Printing Office, Washington, 1917, Vol. II, pp. 411–31

Climate and the Evolution of Civilization, in *The Evolution of the Earth and Its Inhabitants,* edited by R. S. Lull, Yale University Press, 1918, pp. 147–93. Reprinted, revised, in *The Evolution of Earth and Man,* edited by G. A. Baitsell, Yale University Press, 1929, pp. 330–83

Causes of Geographical Variations in the Influenza Epidemic of 1918 in the Cities of the United States, in *Bulletin of the National Research Council,* Vol. 6, Part 3, pp. 1–36, 1923

Environment and Racial Character, in *Organic Adaptation to Environment,* edited by M. W. Thorpe, Yale University Press, New Haven, 1924, pp. 281–99

Tree Growth and Climatic Interpretations, in *Quaternary Climates,* Carnegie Institution of Washington, 1925, Publication 352, pp. 157–203

Society and Its Physical Environment, in *Introduction to Sociology,* by Jerome Davis, H. E. Barnes, and others; Book II, D. C. Heath, New York, 1927; revised ed., 1931, pp. 191–304

The Secret of the Sequoias, in *Proceedings of the National Park Conference,* 1912, 24 pp., Washington, 1912

Effect of Overpopulation on Chinese Character, in *Problems of Overpopulation,* edited by M. Sanger, Birth Control League, New York, 1926, pp. 43–65

Does Civilization Set Us Free? in *Problems of Civilization,* Baker Brownell, Ed., Van Nostrand, New York, 1928, pp. 11–43

Effect of Climate and Weather, in *Human Biology and Racial Welfare,* E. V. Cowdry, Ed.; P. B. Hoeber, New York, 1930, pp. 295–330

Ebb and Flow of Human Population, in *Comitato Italiana per lo Studio della Popolozione,* Roma, Italy, 1932, 19 pp.

Geographic Background of the Revolution, in *Russia between the First and Second Five-Year Plans,* Jerome Davis, Ed., John Day and Co., New York, 1933

Selective Action of Migration, in *Zbior Prac,* H. Arctowski, Ed., Lwow, Poland, 1934, pp. 495–517

Conservation of Man, in *Our Natural Resources and Their Conservation,* A. E. Parkins and J. R. Whitaker, Eds., Wiley, New York, 1936, pp. 559–74 (revised in 1947)

Productivity of the Soil, in *Comptes Rendus du Congres International Geographie,* No. 2: 200–10, Brill, Leyden, Netherlands, 1938

Climatic Pulsations, in *Geografiska Annaler,* Sven Hedin, Ed., Sweden, 1935, pp. 571–608

Climatic Pulsations and an Ozone Hypothesis of Libraries and History, in *University of Pennsylvania Bicentennial Conference Annals,* Philadelphia, 1941, pp. 99–147

Quality of the People, in *America at War,* S. Van Valkenburg, Ed., Prentice-Hall, New York, 1942, pp. 1–37

Influence of Geography and Climate upon History, in *Compass of the World,* H. W. Weigert and V. Stefansson, Eds., Macmillan, New York, 1944, pp. 174–89

Eugenics, in *How to Live,* Irving Fisher and Haven Emerson, Eds., Funk & Wagnalls Co., New York; 21st edition, 1946, pp. 301–06

ARTICLES IN GEOGRAPHICAL PERIODICALS

Annals of the Association of American Geographers

Memoir of S. W. Cushing, 11 (June, 1921) : 109–11

Geography and Natural Selection: A Preliminary Study of the Origin and Development of Racial Character (Presidential Address) ; 14 (March, 1924) : 1–16

On Boundaries, 25 (Sept., 1935) : 134–35

Geography of Human Productivity, 33 (March, 1943) : 1–31

Geographical Journal (London)

Through the Grand Canyon of the Euphrates River, 20 (Aug., 1902) : 175–200

Mountains of Turkestan, 25 (Jan., Feb., 1905) : 22–40, 139–58

Rivers of Chinese Turkestan and the Desiccation of Asia, 26 (Oct., 1906) : 353–67

The Depression of Turfan, in Central Asia, 28 (Sept., 1907) : 254–73

Problems in Exploration: Central Asia, 33 (April, 1910) : 395–419

The Burial of Olympia, 34 (Dec., 1910) : 657–86

Fluctuating Climate of North America, 38 (Sept., Oct., 1912) : 264–80, 392–411 (reprinted in the Smithsonian Institution Annual Report, 1912)

The Geographer and History, 43 (Jan., 1914) : 19–32

Climatic Changes, 44 (Aug., 1914) : 203–10

Bulletin of the American Geographical Society

The Valley of the Upper Euphrates River and Its People, 34 (Oct., Dec., 1902) : 301–10, 384–93

The Depression of Sistan in Eastern Persia, 37 (May, June, 1905) : 1–10, 271–81

The Mountains and Kibitkas of Tian Shan, 37 (Sept., 1905) : 513–30

The Vale of Kashmir, 38 (Nov., 1906) : 657–82

Lop-Nor—A Chinese Lake, 39 (Feb., March, 1907) : 65–77, 137–46

Archaeological Discoveries in Chinese Turkestan, 39 (May, 1907) : 268–72

Historic Fluctuations of the Caspian Sea, 39 (Oct., 1907) : 577–96

The Anglo-Russian Agreement as to Tibet, Afghanistan, and Persia, 39 (Nov., 1907) : 653–58

The Archipelago of Sand Dunes in a Lake of Central Asia, 40 (Jan., 1908) : 1–8

The Climate of Ancient Palestine, 40 (Sept.–Nov., 1908) : 513–22, 577–86, 641–54

Railroads in Asia Minor, 41 (Nov., 1909) : 691–96

Libyan Oasis of Kharga, 42 (Sept., 1910) : 641–61

The Karst Country of Southern Asia Minor, 43 (Feb., 1911) : 91–106

Climatic Changes in the Near East, 44 (June, 1912) : 440–47

The New Science of Geography, 45 (Oct., 1912) : 641–52 (also in *Yale Review*, 2 (Oct., 1912) : 82–96)

The Peninsula of Yucatan, 44 (Nov., 1912) : 801–22

Shifting of Climatic Zones as Illustrated in Mexico, 45 (Jan., Feb., 1913) : 1–12, 107–16

Terrestrial Temperature and Solar Changes, 47 (March, 1915) : 184–89

Geographical Review

Climatic Variations and Economic Cycles, 1 (March, 1916) : 192–202

The Water Barriers of New York City, 2 (Sept., 1916) : 169–83

Our Immigration Problems: A Discussion and Review, 2 (Dec., 1916) : 458–63

The Geographical Work of Dr. M. A. Veeder, 3 (1917) : 188–211, 303–16; 5 (1918) : 244

Climate and the Fall of Rome, 3 (1917) : 401–02

The Sun and the Weather: New Light on Their Relation, 3 (June, 1918) : 483–91

The Future of Palestine, 7 (Jan., 1919) : 24–35

The Sun's Atmosphere: A Review of Bigelow's Work on the Sun, 6 (Dec., 1919) : 350–54

Adaptability of the White Man to the Tropics in Australia, 10 (1920) : 110; 11 (1921) : 475

Climate and Human Efficiency in Korea, 10 (1920) : 45

Quantitative Mapping by Natural Regions, 10 (1920) : 47
The Relation of Health to Racial Capacity—The Example of Mexico, 11 (April, 1921) : 243–64
Atmospheric Moisture: Its Significance and Terminology, 11 (April, 1921) : 304
The Katathermometer, and Humidity, on Ventilation, Dr. Leonard Hill, 11 (1921) : 305
Peat Deposits as Evidence of Climatic Change, 12 (1922) : 142
The Evolution of Climate in Northwestern Europe: A Review, 12 (1922) : 126–30
Report of a Conference on Cycles, 13 (Oct., 1923) : 657–76
Cycles of Health, 13 (1923) : 662
Causes of Cycles, 13 (1923) : 667
Climatic Cycles and the Number of Animals, 15 (1925) : 313–16

Economic Geography

The Distribution of Domestic Animals, 1 (July, 1925) : 143–72
The Handicap of Poor Land, 2 (July, 1926) : 335–57

Bulletin of the Geographical Society of Philadelphia

The Relation of Afghanistan to Its Neighbors, 6 (April, 1908) : 111–19
William Morris Davis, Geographer, 10 (Oct., 1912) : 26–36
Weather and Civilization, 14 (Jan., 1916) : 1–21

Journal of Geography

Kirghiz Nomads and Influence of High Plateaus, 6 (1908) : 313–28
The Arabian Desert and Human Character, 10 (Jan., 1912) : 169–75
Nature and Possibilities of Tropical Agriculture (with S. W. Cushing), 18 (1919) : 341–52
The Rivalry between Sugar Beets and Sugar Cane (with S. W. Cushing), 19 (Oct., 1920) : 255–59
Farms and Villages of Sweden, 37 (March, 1938) : 85–90
What Next in Geography? 41 (Jan., 1942) : 1–9
High Schools and Geographic Immaturity, 44 (May, 1945) : 173–81

National Geographic Magazine

Medieval Tales of the Lop Basin in Central Asia, 19 (April, 1908) : 289–95
The Mountaineers of the Euphrates, 20 (Feb., 1909) : 142–56
Life in the Great Desert of Central Asia, 20 (Aug., 1909) : 749–60
The Afghan Borderland, 20 (Sept., Oct., 1909) : 788–99, 866–76
The Fringe of Verdure around Asia Minor, 21 (Sept., 1910) : 761–75
The Lost Wealth of the Kings of Midas, 21 (Oct., 1910) : 831–46

Home Geographic Monthly

The Stone Age in the Desert, 1 (Jan., 1931) : 9–15

ARTICLES IN OTHER SCIENTIFIC JOURNALS

Monthly Weather Review

Electric Phenomena in the Euphrates Valley, 28 (July, 1900) : 286–90
The Climate of Harput, Turkey, 29 (June, 1901) : 250–53
Climate of the Historic Past, 36 (Nov., 1908) : 359–64
Solar Disturbances and Terrestrial Weather, 46 (April–June, 1918) : 123–41, 168–77, 269–77
The Control of Pneumonia and Influenza by the Weather, 48 (Sept., 1920) : 495–509

Bulletin of the American Meteorological Society

Weather and Human Progress, 8 (Nov., 1927) : 159–64
Solar Disturbances and Interdiurnal Variation of Atmospheric Pressure, 23 (Dec., 1942) : 388–99

Bulletin of the Geological Society of America

Some Characteristics of the Glacial Period in Non-Glaciated Regions, 18 (Oct., 1907) : 351–88
The Solar Hypothesis of Climatic Changes, 25 (Nov., 1914) : 477–590

The Pan-American Geologist
Solar Cyclonic Explanation of Glaciation, 39 (Feb., 1923) : 25–42 (with S. S. Visher)
Journal of Geology
The Hurricane Fault, Utah (with J. W. Goldthwait), 11 (Jan., 1903) : pp. 46–63
Pangong : A Glacial Lake in the Tibetan Plateau, 14 (Oct., 1906) : 599–617
Scientific Monthly
Coincident Activities of the Earth and Sun, 72 (June, 1908) : 492–502
Influenza and the Weather in the United States in 1918, 17 (Nov., 1923) : 462–71
Quantitative Phases of Human Geography, 24 (Oct., 1927) : 289–305
Science
The Matamek Conference on Biological Cycles, 74 (Sept. 4, 1931) : 229–35
Proceedings of the National Academy of Sciences
Temperature Optima for Human Energy, 3 (Feb., 1917) : 127–33
Quarterly Journal of Economics
Climatic Change and Agricultural Exhaustion as Elements in the Fall of Rome, 31 (Feb., 1917) : 173–208
Canadian Journal of Economics and Political Science
Geography and History, 3 (Nov., 1937) : 565–72
Ecology—Pneumonia and Influenza and the Weather, 1 (1920) : 6–23
Asia
Germany's Prospective Loot in Asia, 18 (June, 1918) : 480–89
Man and Nature in Hot Climates, 27 (Oct., 1927) : 822–29, 868–71
The Tropical Plantation, 27 (Nov., 1927) : 918–25
Annals of the American Academy of Political and Social Science
Agricultural Productivity and Pressure of Population, 198 (July, 1938) : 73–92
Journal of Race Development
Physical Environment as a Factor in Turkey, 1 (April, 1911) : 460–81
Geographical Environment and Japanese Character, 2 (Jan., 1912) : 256–81
The Adaptability of the White Man in Tropical America, 5 (Oct., 1914) : 185–211
A Neglected Factor in Race Development, 6 (Oct., 1915) : 167–84
Journal of International Relations
The Factor of Health in Mexican Character, 2 (Oct., 1920) : 224–33
Foundation For Study of Cycles, Reports
Cycles, Rhythms, and Periodicities, 1946, No. 14
Two Intriguing Cycles, 1946, No. 15
Broader Aspects of Environmental Cycles, 1946, No. 16
Journal of the American Water Works Association
Variations in Precipitation as Affecting Water Works Engineering, 3 (March, 1916) : 94–101
Modern Medicine—The Interpretation of the Death Rate by Climographs, 1 (1919) : 13–22
American Journal of Surgery
Air Control As a Means of Reducing Post-Operative Death Rate, 35 (July, Oct., 1921) : 82–90, 98–100
The Modern Hospital
Air Control and the Reduction of Death Rate After Operations, 14 (Feb., 1920) : 10–16, 111–14
Purpose and Methods of Air Control in Hospitals, 14 (1920) : 271–75
Methods of Air Control and Their Results, 14 (1920) : 348–53
Records of the Past
Prehistoric Mounds in Eastern Turkey, 1 (June, 1902) : 163–71
The Hittite Ruins of Hilar, Asia Minor, 2 (May, 1903) : 131–40
Archaeology in the Center of Asia, 7 (March, 1908) : 96–107
Physical Environment of the Southwest in Pre-Columbian Days, 11 (May, 1912) : 128–41

American Historical Review
Changes of Climate and History, 18 (Jan., 1913) : 213–32
Yale Scientific Magazine—The Next Revolution Will Be Biological, 2 (Nov., 1927) : 21–2, 50
Journal of Forestry—Marginal Land and the Shelter Belt, 33 (Nov., 1934) : 804–12
Journal of Social Philosophy—The Philosophy of Climate, 4 (Oct., 1938) : 73–7
Journal of the American Society of Agronomy
The Adaptation of Corn to Climate, 27 (April, 1935) : 261–70
Journal of Genetic Psychology—Season of Birth and Fame, 64 (1944) : 323–26
Journal of the American Museum
Prediction of Climatic Variations, 16 (Feb., 1916) : 97–103
Transactions of the Wisconsin Academy of Sciences
Experiments with Available Roadmaking Material of Southern Wisconsin, 11 (1897) : 249–54
Harvard Bulletin of the Museum of Comparative Zoology
The Hurricane Fault, Utah (with J. W. Goldthwait), 42 (1904) : 199–259
Air Affairs
Geography and Aviation, 2 (Aug., 1947) : 46–60

One or more articles in *Encyclopedia Britannica* (1929), *Encycl. of Social Sciences* (1928), *Encycl. of American History*

OTHER ARTICLES

Harper's Magazine
The New Province 2000 Years Old, 116 (Dec., 1908) : 19–29
A Canvas Boat on the Dead Sea, 119 (Jan., 1910) : 186–96
Beyond the Dead Sea, 121 (Feb., 1910) : 419–30
The First Americans, 123 (Feb., 1911) : 451–62
The Greenest of Deserts, 123 (June, 1911) : 50–8
American Archaeology, 125 (Jan., 1912) : 291–301
The Secret of the Big Trees, 126 (July, 1912) : 292–302
Work and Weather, 130 (Jan., 1915) : 231–44
The Mystery of the Yucatan Ruins, 128 (April, 1914) : 757–66
The Lordly Sun, 146 (March, 1923) : 440–48
Scribner's Magazine
The Suicide of Russia, 77 (Feb., 1925) : 156–60
The Minimum Standards of Australia, 78 (Oct., 1925) : 412–21
What the Weather Does to Us, 79 (June, 1926) : 571–77
The Biological Antecedents of Jesus, 80 (July, 1926)
The Sifting Power of Cities, 80 (Sept., 1926) : 316–24
American Magazine
What the Weather Does to You, 97 (June, 1924) : 38–9, 164–67
Where Our Leaders Come From, 141 (June, 1946) : 38–9, 157–59
Century
The New Astrology, 110 (May, 1925) : 106–14
Yale Review
The New Science of Geography, 2 (Oct., 1912) : 82–96
Our Biological Future, 17 (Oct., 1927) : 136–52
Review of Reviews
The High Cost of Weather, 75 (Jan., 1927) : 38–42
American Mercury
Religion and Who's Who, 11 (Aug., 1927) : 438–43
A Test of Eugenics, 15 (Sept., 1928) : 13–19

The Nation
Why the American Woman is Unique, 125 (Aug. 3, 1927) : 105–07
The Outlook
The Descendants of Who's Who, 146 (Aug. 24, 1927) : 538–40 (with L. Whitney)
The "Thing" in Families, 147 (Sept. 7, 1927) : 21–23 (with L. Whitney)
Good Housekeeping
Ought I to Marry, 105 (Nov., 1937) : 232–36
The Forum
Where Can Man Live Best, 75 (May, 1926) : 708–17
Education
A Geographer's View of America's Queerness, 52 (Jan., 1932) : 253–58
Science Digest
The Season of Birth, 4 (1938) : 1–5
Are We As Rich As We Think? 14 (July, 1943) : 25–31
Appalachia
With a Minbashi in Turkestan, 11 (1905) : 17–27
The Round Table
A Raid on Kafir Kala (Jan., 1908) : 174–76
Carto Craft Comments
Asia, Her Geography, 3 (March, 1938) : 1–6
New Outlook
Russia's Worst Enemy, 161 (April, 1933) : 36–39
The Nation's Health
What the Air Does to Us, 3 (May, 1921) : 265–66
Eugenics
The Next Revolution, 1 (Oct., 1928) : 6–14
Eugenical News
Capacity and Heredity, 17 (May, 1932) : 78–80
An Environmental Assistant of Eugenics, 22 (Nov., 1937) : 101–04
A Thousand Years of Eugenics in Iceland, 28 (March, 1943) : 8–10
Population, Peace or War, 30 (June, 1945) : 17–19
University of Pennsylvania Bulletin
Origin of Racial Differences, 19 (March, 1932) : 482–85
Survey Graphic
Climate and City Growth, 21 (Oct., 1932) : 445–48
Philadelphia Purchaser
Business Cycles and the Weather (March, 1927) : 9–15
Social Forces
A Neglected Tendency in Eugenics, 12 (Oct., 1933) : 1–8
Christian Work
The Children of Ministers, 117 (Nov., 1924) : 530–32

ABSTRACTS OF PAPERS CONTRIBUTED TO THE PROGRAM OF THE FORTY-FOURTH ANNUAL MEETING, HELD IN CHARLOTTESVILLE, VIRGINIA

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CARTOGRAPHY AND MAP INTELLIGENCE

HERMAN R. FRIIS—*Statistical Cartography: Selected Examples of Its Development during the Eighteenth and Nineteenth Centuries, Particularly in the United States.*

The evolution of statistical cartography, particularly since the seventeenth century, is a subject of absorbing interest. This graphic tool which geographers find indispensable as a composite expression of the distribution of quantitative data has an infinite number of uses, many of which were developed during the eighteenth and nineteenth centuries by social scientists as well as physical scientists.

An examination of scientific literature published during the eighteenth and nineteenth centuries reveals a surprisingly large number of studies of the graphic mediums available and potentially useful for presenting quantitative data not only as illustrative material to accompany a particular study but frequently as ends in themselves, such as maps showing the distribution of population, precipitation, and agricultural products, transport facilities by ratio of volume of use, and mineral production by kind and quantity.

To state positively when cartographic mediums were first employed as a device for presenting statistical and similar data is of course hazardous. Available sources appear to indicate that the eighteenth and nineteenth centuries were the period during which many of the types of mediums were developed, in some instances in considerable detail and with distinctive chromatic values. Physical scientists appear to have used statistical cartography before social scientists did, though the latter, during the period 1775–1875, were responsible for developing many special forms of presentation. During the past hundred years geographers have been among the leading exponents and perhaps most frequent users of statistical cartography. August Petermann, Matthew Fontaine Maury, and Alexander von Humboldt were among the first geographers to use statistical cartography and were responsible for the development of special devices for expression which have continued to this day. The American Geographical and Statistical Society of New York (now the American Geographical Society) was among the first scientific societies in America to encourage and publish articles on statistical cartography.

Although the paper presented includes discussion of the evolution of statistical cartography generally, emphasis is on its evolution in the United States. The topographical engineers of the United States War Department and hydrographers in the

United States Navy Department were among the first to employ statistical cartography officially in this country. Meteorologists, notably Lorin Blodget and James P. Espy, made significant contributions as early as the 1850's; medical scientists, such as Edward H. Barton, employed statistical cartography to show the distribution of diseases; military leaders, such as General William T. Sherman, used elementary forms of statistical cartography as sources of intelligence information during their campaigns; and beginning about 1870 the United States Bureau of the Census made elaborate and internationally recognized major contributions in the field.

RICHARD EDES HARRISON—*Progressive Grading of Communities for Maps and Statistics.*

The grading of communities according to size for statistical and mapping purposes has not been approached scientifically or consistently. When examined, the schemes in use show little agreement. A precise mathematical solution is found to be geometrical progression with the factor square root of ten (3.162). This is practical for exact statistical methods, but for mapping and considerable statistical work, the progression has been modified by substituting 3 where 3.162 occurs. This results in the series 10,000; 30,000; 100,000; 300,000; 1,000,000; 3,000,000; the factors being 3; −3.3; −3; −3.3; −3.

The resulting breakdown of towns was analyzed with respect to the number of towns falling into each group. The figures indicate that the number of towns in a given group is in inverse ratio to the population magnitude of that group. These rules are most closely adhered to in the largest and best developed countries.

The progression with a factor of the square root of ten, is found also to have a very practical application in the matter of map scales. For example, the scale of 1 : 31,620 is almost exactly one-half inch to the mile (the error is only .00126%).

CLARENCE B. ODELL—*Some Problems Relating to the Accumulation of Geographical Statistical Information.*

Accurate generalizations are based usually upon quantitative and detailed information. Most persons think statistically in terms of numbers, values, weights, or other quantitative data. Most comparisons of two or more areas of the earth, whether true political units or regional areas, are based upon their differences or similarities as to areas, populations, production, trade, or other quantitative details. Understandings of international, national, or local problems are not complete without accurate analyses of pertinent comparable and accurate statistics.

The purpose of this study is to present the steps and problems involved, and the quantitative results of an accumulation of such a body of geographic statistics as is illustrated by the section called *Geographical Summaries* included in the *Encyclopaedia Britannica World Atlas.* This paper avoids any discussion supporting the selection of the 190 political units for the general regional tables or of the 177 units for the detailed individual country tables. Neither are arguments given supporting the selection of subject matter for the 15 tables for each country, either in themselves

or in their details of column headings. This study proposes to outline the problems involved in (1) the classification of sources used in accumulating the more than 100,000 statistical entries; (2) the acquisition of the hundreds of foreign published and unpublished sources; and (3) the appraisal and evaluation of available data. In conclusion, quantitative results are presented concerning a collection of geographical data as illustrated by the statistical section of the *Britannica World Atlas.*

In accumulating these geographical data, the sources utilized are classified into three groups of official sources and two groups of unofficial sources. The acquisition of the sources is facilitated by a systematic procedure of correspondence and questionnaires. The appraisal and evaluation of the available data involves a study as to their completeness, accuracy, and comparability, which in turn involves conversions and adjustments to comparable units. Through a program of continuous revision the body of comparable statistics always is based on the latest available authentic sources.

LEONARD S. WILSON—*Map Intelligence: Tentative Definitions and Delimitations of the Field.*

With mounting needs for information about foreign lands during 1941–45, the use of maps increased rapidly and both geographers and laymen became intensely interested in their procurement and use. The supply of foreign maps was insufficient to supply all users. In response to these needs, a map information service, limited to the dissemination of information about map data and sources, was established.

Later, with a more adequate supply of maps available, a problem of increasing importance was that of interpreting and describing the contents of maps for the benefit of users who lacked training in map interpretation. This need, in turn, was met by issuing a series of reports or studies based on geographical description of areas not available for field work. Publishing authority, compilation techniques, and underlying purpose formed the basis for map evaluation. Properly evaluated maps were then subjected to detailed interpretation, and numerous Map Intelligence Studies, focused on specific international problems, were issued. Taken as a whole, the published studies bore out some widely accepted definitions of the field of geography. In detail they represented the concentration of geographic training and knowledge on specific distributional or areal problems.

CLIMATOLOGY

JOHN R. BORCHERT (Introduced by Glenn T. Trewartha)—*Some Regional Differences in the Atmospheric Circulation Over North America.*

Maps of monthly mean airflow about fifteen hundred feet above the surface over North America and the surrounding waters show that the mean flow east of the Rockies persistently diverges from three main source regions: Greenland and the Polar Ice Cap, the Subtropical North Atlantic, and the interior of the continent.

East of the Rockies most of Canada receives its mean airflow from the Ice Cap throughout the year. Over the Gulf coast and the southeastern United States the mean flow throughout the year is from the subtropical North Atlantic. Over the

western high plains the flow throughout the year is from the interior. For the remainder of the United States, eastward from the high plains, the mean airmass source shifts from the warm, moist tropical Atlantic in summer to the cold, dry continental interior in winter.

Since one can tell from the maps the mean airflow over any place each month, it is possible to make isarithmic maps of the number of months per year with a mean airflow from each of the main source regions. These isarithmic maps show that large areas dominated throughout the year by the three main source regions are separated by zones of relatively rapid transition. The climatic transition zones thus suggested form a pattern similar to the pattern of large-scale differences in natural vegetation in interior and eastern North America. These zones are therefore being studied further.

SAMUEL VAN VALKENBURG AND S. R. ABRAHAMSON—*A New Koeppen Map of Africa.*

A New Koeppen map of Africa was made by Mr. Abrahamson using all available data. The map was part of a climatic study of Africa carried on at Clark University. In making the map, difficulties arose in the use of the Koeppen symbols and the authors consequently suggest some modifications:

1. In A climates the formula of summer rain (t + 14) should be used to determine the B boundary.

2. In determining the seasonality of the rainfall to be used for the B classification in C and D climates the following rules should be applied:

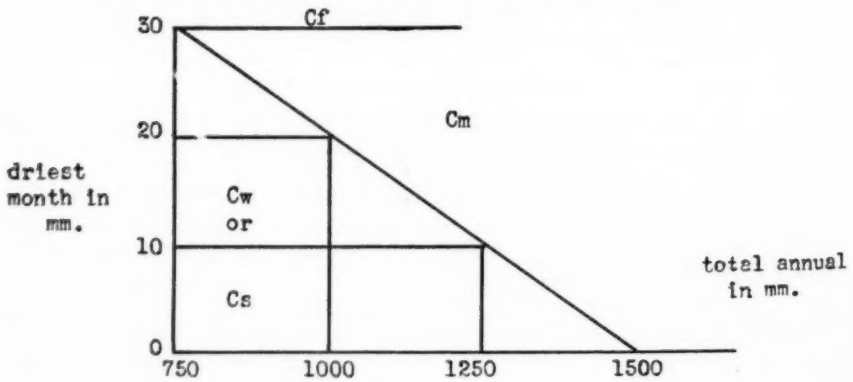
(a) Use the formula for summer rain (t + 14) if at least 70 per cent of the total falls during the summer months.

(b) Use the formula for winter rainfall (t) if at least 60 per cent of the total falls during the winter months.

(c) Use t + 7 in all other cases.

3. The addition of a Cm type of climate in those C climates due to elevation. The Cf, Cm, Cw or Cs to be determined by the accompanying diagram.

4. The use of As or Cs when the Aw or Cw crosses the Equator.



ECONOMIC AND REGIONAL GEOGRAPHY

BURTON W. ADKINSON—*Washington State Coal Mining.*

Washington is the only Pacific coast state producing significant quantities of coal. Four periods of coal production can be identified.

From 1853 to 1880, major emphasis was on exploration and development of coal fields. Considerable quantities of coal during this early period were used in California markets as bunker fuel and fuel for railroads.

Between 1880 and 1910 the railroads dominated the coal industry. Production increased rapidly as railroads were built to the more productive fields. Also the railroads were the major market for the coal. During this period, mining expanded until production reached approximately 4 million tons annually. In addition to fuel for railroads, coal was used for bunkering ships, for domestic fuel, and increasingly for industrial purposes.

Between 1910 and 1934, coal mining generally declined, contributing factors being: California fuel oil and hydroelectric power replaced coal in many markets; railroads began to electrify their lines; many industrial plants found electricity more economical power than steam from coal; ships and railroads were converting to oil for fuel; many private and public buildings were heated with fuel oil, and so on.

Between 1935 and 1945 coal production increased slightly. New uses were found for coal, and the increased industrial and commercial activity in the Pacific Northwest created an additional demand. The logical market area for Washington coals is Washington, Oregon, and northern Idaho. It is estimated that this area consumes on an average 3½ million tons annually.

It may be well to review some factors which have kept the coal-mining industry in Washington at a relatively low level. More than 58 per cent of the reserves are low grade bituminous coal. In addition, many coal beds have much foreign material such as bands of shale and bony coal. These factors have materially affected mining costs. Also, the low quality of most coals in Washington limits the market to the industrial field. Higher-grade and lower-priced coal from Utah and Montana compete successfully with Washington coal in the markets of eastern Washington, eastern Oregon, and northern Idaho.

As long as the Northwest has available cheap hydroelectric power and ample supplies of California fuel oil, and coal from neighboring areas can be mined more economically, the Washington state coal industry, with its relatively high production costs and large percentage of medium- and low-grade bituminous coal, will not be able to expand its markets beyond those now available.

LYDA C. BELTHUIS (Introduced by C. M. Davis)—*Sawmilling in Iowa, 1833–1947.*

In Iowa, as in other prairie states, the original forests were principally along the streams. People in moving from the wooded east formed their settlements with access to the forested areas and built sawmills and saw-and-grist mills as soon as they came.

The first or pioneer period of sawmilling, starting in 1833 and lasting until 1860, was characterized by the presence of many small mills scattered along the streams throughout the state. These cut local timber which was manufactured near the mills for the purpose of supplying local demands for wood products.

During the middle period, 1860–1910, large amounts of timber were rafted from Wisconsin and Minnesota to Iowa sawmill centers because most of the original forests of Iowa had been depleted by that time. In this same period, many of the small saw or saw-and-grist mills established to supply the local pioneer demand came to the end of their usefulness and their function was taken over by fewer and larger mills located in the Mississippi river towns. From these the growing network of the railroads carried lumber and wood products to the inland towns. The pattern of distribution in this middle period was one of concentration in both numbers of mills and the extent of the milling area to the district along the Mississippi. Due to the depletion of the northern pineries, the rafting of logs and lumber on the Mississippi virtually had ceased by 1910, which fact brought to a conclusion the middle period of Iowa woodworking.

The third or present period is marked by local and national sources of materials and local and national markets. Lumber comes to the present wood-using industries in small amounts from the localized cutting of portable mills along the stream forests; in large amounts, it is brought in by rail transportation from the several commercial lumbering areas of the country.

WILLIAM J. BERRY (Introduced by Henry M. Leppard)—*Trading Centers in Haakon County, South Dakota.*

The trading centers of Haakon County, in western South Dakota, reflect nicely the character and trends of the region in which they are located. They are small in response to the small population, they are far apart as are in general the homes of the rural people, and they are not so numerous now as they have been, largely because there are fewer people in the region than formerly. Haakon County is representative of the plains land of western South Dakota and the trading centers, in distribution and function, are typical of centers in that part of the state.

In Haakon County there are fourteen trading centers. Eight of them are roadside trading posts consisting each of a single store. Four have more than one and less than ten business units. Of the other two, Midland has 26 units, and Philip, 66.

Prior to the opening of the county to homesteading, in 1904, there were three trading centers. Three more were established after the homesteaders began to arrive and before a railroad was built into the county, in 1907. In 1911, at the peak of homesteading, there were 31 centers, the largest number at any time. Most of the 14 there now were among the 31 of 1911 but there have been some new establishments and some re-establishments in more favorable places as roads have changed.

Philip, the largest, has the best access to the more productive farming localities of the stations along the railway. It is the nearest to Milesville Flat, to an important dairying section, and to important grain-farming areas in the county next to the

west. The hills, which parallel the railway, are less high and steep at Philip than elsewhere in the county. The trading area tributary to the city is about 2,800 square miles in size, though part of it is shared with centers of lesser importance. Midland, next in size, serves about 900 square miles in eastern Haakon County and western Stanley, adjacent. The twelve others are within the trading areas of Philip and Midland and serve their respective localities in a limited manner.

The trading centers function in a division of labor in the local agricultural and grazing region. Essentially the business men are specialists in collecting and shipping the products of the farms, and in supplying to the farmers the materials which they obtain from outside their own communities.

ADELBERT K. BOTTS (Introduced by Wallace W. Atwood, Sr.)—*Conservation in a Primitive Hunting and Fishing Economy.*

Northern Manitoba is a land in which the inhabitants are now, as they have been all through history, distinctly dependent upon native fauna for existence. Primitive hunting and fishing, the dominant economic activity, has experienced several phases:

1. The local consumptive phase prevailed before the arrival of fur traders. Hunting and fishing were practiced for local consumption and maintenance. There was no stimulus to excessive, selective slaughtering, and mankind and nature experienced an approximate balance between production and consumption of resources.

2. The exploitive phase was introduced with the establishment of fur trading. Selected species of animals were hunted and trapped to virtual extinction. Firearms, steel traps, world market demands, and organized fur trading each introduced new elements and factors into the environmental complex.

3. The conservative phase is at present being instituted. Experimentation in conservation methods and practices adapted to the environment is fostered and maintained by the Provincial Government. Regulation of fishing and trapping, including the control of registered trap lines of white trappers, is strictly enforced. Among Indian trappers, trap-line surveys and censuses together with conservation education is progressing. In other words, every constructive effort is being made to bring local fur- and fish-producing capacity and production into approximate accord.

The present aspect of northern Manitoba's primitive hunting and fishing economy bears the harsh marks of unrestricted exploitation but shows, at the same time, much promise of achieving stability through carefully planned and intelligently administered conservation.

ALBERT S. CARLSON—*The Vacant Plant as an Industrial Location Factor.*

The manufacturing plant, vacated and in suitable condition for occupancy by a new tenant, assumes an increasingly important place among the economic geographic conditions that determine the industrial structure for a given region or locality. This is particularly true in the United States, because such a large part of our manufacturing belt possesses the amount of floor space necessary to carry on the estimated

amount of production capable by such an area in the future. Thus, many new firms locating in older manufacturing areas will find floor space already constructed and suitable to their use.

From a structural point of view, many of the plants built in recent years and the new ones to be constructed will be so arranged that various manufacturing processes can be carried on within them because they will have wide floor space without pillars or corners. Aiding this is the increased use of individual electric motors. In addition to these historical and technological conditions, there is the immediate effect of the increase in floor space resulting from World War II. Millions of square feet of floor space have become or will become available for use by other than the war occupants. Thus with the improvement in transportation facilities, an increasing network of transportation routes, and less difference in the cost of power, a larger percentage of firms can choose from among buildings already constructed and of established lower rent.

The vacant plant, when it is in satisfactory condition for further use, thus permits the industrial structure of a town to change without a change in square feet of industrial floor space and the industrial skyline may remain the same. Furthermore, it provides the town or region with the opportunity to establish a new industry which is adapted to current supply, demand, and cost rather than to historical conditions. The significance of these changes can be illustrated from situations in New England cities and by new uses found for vacant World War II manufacturing plants throughout the nation.

JOHN WESLEY COULTER—*Stock Raising in Eire* (A paper based on fieldwork during the summer of 1947).

The natural environment of Eire (pronounced exactly like "Sarah" without "S") is peculiarly favorable for stock-raising and does not encourage the production of cereals. This island area, lying in the path of the Gulf Stream and the Prevailing Westerlies, has a well-distributed rainfall of thirty to fifty inches a year, great humidity, and mild winters. The broad, basin-shaped Central Plain, underlain by limestone, is excellent for cattle grazing. With such a favorable environment it is not unexpected that dairying and stock farming are the economic backbone of the Republic. However, it is astonishing to find that both dairy farming and the beef-cattle industry are not in a flourishing condition. In many urban centers fresh milk is scarce, especially during the winter months, butter is rationed and dairy produce is not exported. During the past decade there has been a gradual decrease in the production of milk due to a decline in the number of cows and a reduction in the milk yield per cow. Among factors which have caused the decline in numbers are (a) a comparatively greater increase in the price of beef cattle than in that of milk, (b) scarcity of labor, (c) the high prices obtainable for good cows for export, and (d) the application to dairy farms during the last war of a compulsory tillage order. The beef-cattle industry in Eire is dependent on dairy farming, for the calves for

fattening come from dairy cows. With the reduction in the number of cows, land used for raising beef cattle can be kept fully stocked only by holding the animals to a greater age than is profitable. In Eire an attempt is made to breed dual-purpose cattle, animals that are good for both milk and beef. This is partly due to the small size of the country and to the smallness of farms where specialization is not practicable. There are three distinct types of agriculture—peasant farming, dairy farming, and grazing; there are also combinations of any two and all three of these types. The Republic of Eire has made a creditable record towards the solution of many problems which confronted the Saorstat Eireann on its establishment in 1921. Among measures being taken to better the situation in stock farming are the distribution of purebred bulls, compulsory production of forage crops, improvement of pasture lands, and the education of the rural population.

RAYMOND E. CRIST—*Static and Emerging Cultural Landscapes on the Islands of St. Kitts and Nevis, British West Indies.*

The two volcanic islands of St. Kitts (68 square miles) and Nevis (56 square miles) in the British Leeward Islands, though physically very similar, have dissimilar cultural landscapes. The historical development on the two islands ran almost parallel till the early years of this century. The prosperity of the British sugar islands declined following the severance of natural trade relations with the Americans during the Revolutionary War; but sugar bounties in Europe made that continent progressively independent of cane sugar; and the abolition of slavery throughout the British Empire in 1834 meant the final overthrow of the traditional labor regime. The cane-sugar industry continued to vegetate in both these islands until it was rejuvenated in a measure by the erection of a modern sugar factory on St. Kitts. But Nevis was too small to support a modern sugar mill and the land was too stony to permit of mechanization. As a result many estate owners became "land-poor," and the government bought up a number of estates which were given in long-term leases in plots of a few acres to land-hungry peasants. The pattern of dispersed settlement is being substituted for the former one of concentration in villages, contour farming is practiced on the steeper slopes, and a brisk export trade in yams, sweet potatoes, eddoes, dasheens, carrots, cucumbers, and many varieties of fruit has developed with St. Kitts. The agricultural pattern of Nevis has thus achieved a modicum of dynamism, and the corollary of this development has been a broadening of the economic base of the entire population of the island.

SIGISMOND DER. DIETTRICH—*Florida's Climatic Extremes.*

Florida's climate is the product of its location and its land-sea relationship. Lying in the subtropical desert fringe but on the southeastern corner of a considerable landmass where monsoonic influences result in a pleasantly cool, dry winter and a warm, humid summer, Florida's climate is far from being a desert.

Since about two-thirds of the state consists of a peninsula and the rest of a narrow coastal zone, marine influences are dominant; but strong continental influences occa-

sionally interfere with the usual conditions, bringing about "cold spells" and "freezes." The southeastern location in the trade-wind belt places Florida in the hurricane zone where these oceanic storms easily invade the land causing heavy losses to man.

Both types of calamities had profound effects upon human affairs in Florida. In ultimate analysis, however, the destructive effect of them was more than balanced by the favorable changes in human adjustments caused by them. The Big Freeze of 1894–95 was instrumental in opening up South Florida and resulted in a more satisfactory location of the state's two leading industries, the tourist and citrus industries. The Miami hurricane taught people the necessity of building storm-resistant buildings, and how to behave in a hurricane. The Matecumbe hurricane ended an economically dead enterprise and enabled state and federal authorities to construct in its place one of the most picturesque scenic roads of the country, the Overseas Highway to Key West.

So in the past the Floridians were able to turn disaster into progress. Now the hurricanes of 1947 have wrought great economic losses, yet in the destruction of human life and of property they do not compare with the former ones. Nevertheless, they have reminded the people that natural calamities like freezes and hurricanes are recurrent events and as such they should always be considered when formulating plans for the use of Florida's natural resources.

LOYAL DURAND, JR.—*Italian Cheese Production in the American Dairy Region.*

A recent development in the economic geography of the American Dairy Region has been the spectacular rise in the output of the Italian varieties of cheese—asiago, caciocavallo, icanestrato, parmesan, provolone, provolette, reggiano, ricotta, romano, seamorze, gorgonzola, and others.

The production of Italian cheese has been engaged in for some time in portions of New York, Wisconsin, and California. In New York the early start of the industry was primarily related to the market factor of a large regional Italian-born population, in California to the demand created by the existence of both the large Italian and Italian-Swiss populations of that state. Early production of Italian cheese in Wisconsin was carried on by Italian colonists in some of the cutover lands of the northeastern portion of the state.

The major share of Italian cheese now originates in Wisconsin and the Upper Peninsula of Michigan, and reaches nationwide markets. Despite the early manufacture of Italian types of cheese by a few immigrants, the greater portion of the Wisconsin-Upper Michigan industry dates from 1916, and obtained its start through the association of the Italian general consul in Chicago and the Italian consul at Duluth, formerly a resident of Calumet, Michigan, on the Copper Range. The enterprise was established in the cutover country of northwestern Wisconsin, south of Duluth and Superior. From the two Northern Wisconsin nuclei in the cutovers the industry has spread into established dairy regions in northwestern and southeastern Wisconsin, and into growing dairy regions of the Upper Peninsula of

Michigan. By 1945 the Italian-cheese output of Wisconsin had surpassed the Swiss-cheese production of the state, and had attained a position second only to that of American cheese. Italian varieties are manufactured both in small crossroads cheese factories, and in large, newly built modern plants. While some cheesemakers are of Italian birth or descent the majority now are of American birth and commonly of German descent, and the industry is not associated with farm communities wherein there are farmers of Italian ancestry. Some 81 factories engage in the production in Wisconsin, five in Upper Michigan.

The product of the infant industry of the 1920's competed with cheese imported from Italy. By 1940 American production exceeded the imported in quantity, and under present world conditions is paramount in the American market. Overseas competition has shifted from Italy to Argentina, that nation now competing in eastern markets with domestic Italian cheese.

FRANCIS E. ELLIOTT (Introduced by Sidman P. Poole)—*Locational Factors Affecting Industrial Plants.*

The paper is an attempt to develop what appears to be a new approach to the problem of industrial plant location. It grew out of the desire to simplify the extremely complex conventional manner of analyzing the relative importance of the factors involved.

Examples are offered to show that all factors influencing the location of an industry can be arranged into two general groups, called here invariables and variables. Invariables are determined by environment and are beyond the control of the industry concerned; variables, in contrast, can be controlled and made to fit the individual need.

To decide whether an individual factor in a particular case is variable or invariable, the measuring stick of volume of expected business and value added by manufacture (i.e., the difference between cost of raw material and sales price of a finished unit) is used. Variables and invariables are different in each case to be analyzed. Examples are cited for transportation costs, climate, market pull, raw material pull, and labor. Invariables and variables are used then to eliminate the regions and areas unfit for a particular industry, and by a continued process of elimination, a pin-point location is reached.

ANGUS HILLS (Introduced by Donald F. Putnam)—*Rural Settlement in the Great Clay Belt of Northeastern Ontario.*

Northeastern Ontario is a pioneer area whose land-use problems are of first order of magnitude. In spite of forty years of determined colonization efforts, there are now only a few thousand acres of well-developed farm lands scattered along a 300-mile frontier and surrounded by 1¼ million acres of manhandled land, much of which was abandoned by the settlers after they had cut the timber. Generally, this attempt to develop the land for farming has retarded the regeneration of desirable forest species and has encouraged the growth of alders and other weed trees.

Natural land-types indicating patterns of land form and other natural qualities of land provide the essential framework for land-use studies. For example, it is important, in the Clay Belt, to recognize differences in soil and vegetation which result from better natural drainage, particularly where glacifluvial sands and gravels underlie clay at shallow depths.

Geographic studies in the Clay Belt suggest the following conclusions:

1. Agricultural development in the Clay Belt has not been restricted by lack of available land with potential ratings medium to high for that climatic area.

2. Clearing, draining, removing excess peat, fertilizing, and other operations required to establish and maintain a satisfactory productivity level are not extremely difficult but cost so much in time, labor, and money that they are, with rare exceptions, economically impractical for individual enterprise.

3. Likewise, the difficulties imposed by an unfavorable climate can be reduced by technological advances, but the problem of economic returns under adverse conditions will remain.

4. Since the land-type pattern has a north-south trend, the settlement which followed the Canadian National Railway went across the "grain" of the natural landscape.

5. Through trial and error, well-developed farms in the greatest proportion have sprung up on lands of the highest agricultural potential. However, only a very small fraction of the better lands taken up by settlers has been developed satisfactorily.

6. Since future settlement in the Clay Belt is inevitable, it should be planned on a multiple-use basis. For example, a planned economy combining farming with forestry should be contemplated. The above statements are based on the following observations:

(a) Although the potential of even the best lands in the Clay Belt is (except under the most favorable coincidence of circumstances) too low for economic agricultural development at the present time, most of these lands are capable of producing crops of timber, game, fur, or fish on an economic basis.

(b) Generally the adjustment of Clay Belt settlers to their land has been on a multiple-use basis in spite of policies intended to establish full-time farming.

On lands with higher agricultural potentials, provision should be made for a gradual shift from part-time to full-time farming as the need develops.

HARRY E. HOY (Introduced by Leslie Hewes)—*A Decade of Land Use on the Northern Tablelands of Nebraska.*

The Northern Tablelands of Nebraska are bordered on the southwest by the Sand Hill region and on the north by South Dakota. A study of the land utilization reveals the transitional nature of the region located between the spring-wheat belt on the north and the winter-wheat belt to the south.

By means of a system of rectangular blocks and strip-traverses the land utiliza-

tion of approximately ten per cent of the region was mapped in 1938 and re-examined in 1947. The original study of 1938 was made at the end of a fourteen-year period of moisture deficiency and at a time when prices for farm products were still at depression levels. The second study (1947) followed nine years of high production and high prices for farm products. This paper attempts to report the effects of high yields and prices upon the use of the land.

Despite favorable crop yields and prices during the relatively wet decade, grasslands have not been disturbed. Meanwhile approximately one per cent of the cultivated land has been returned to grass since 1938. The greatest change in acreage has been in land use for corn. Corn yields have been generally fair to excellent. Its acreage increased approximately ten per cent during the humid period. This increase was at the expense of grain sorghums, barley, rye, and oats. The acreage of land left idle was reduced by half. Wheat, long unimportant in the area, increased in acreage from slightly less than one per cent to nearly two per cent. Most of the wheat is grown on the Boyd Table and is produced more for feed than for cash grain.

There were more abandoned farmsteads in 1947 than in 1938. Vacant houses in 1947 were the result of farm consolidation, whereas in 1938 they were visible proof of the discouragement and bankruptcy prevalent on the 160-acre farms on the best soils. Farmers on sandy-soil areas learned through experience during the years following 1900 that farms or ranches of 640 acres or less were too small.

Land prices have increased 300 to 400 per cent during the decade but in 1947 were below those of 1920. Land is being sold for cash or with substantial down-payments. The chaos of over-lending and foreclosure, whereby nearly half the farms on the best soils were owned by loan agencies (1938), should not be repeated.

Farmers on the Northern Tablelands are optimistic in 1947. They expect a return of dry years and low prices. They are confident they can weather adverse conditions because of their larger farms, less indebtedness, large inventory of farm equipment, and more and better quality of livestock.

DONALD P. KERR (Introduced by Donald F. Putnam)—*The Location of Manufacturing Industries in Upper Canada in the First Half of the Nineteenth Century.*

By the middle of the nineteenth century, the factory system had been introduced into Upper Canada and its shallow roots were fairly well established. Prior to the year 1851, there were no completed railroads in Upper Canada, although many plans had been made and a few tracks had actually been laid. It was of necessity that early manufacturing enterprises were located mainly in lake ports or river towns on accessible transportation routes. With the spread of the railroad system, there were significant shifts in the localization of industry. Despite these changes during the latter part of the nineteenth century, early locations still dominate and have given rise to large industrial cities such as Toronto, Hamilton, and Oshawa.

In conjunction with the rise of the factory system, there was the establishment of numerous villages at water-power sites. The spread of these small hamlets closely followed the advance of the lumber industry and pioneer settlement through Upper Canada. There emerged on the landscape typical sawmill or gristmill villages, many of which have later grown into industrial cities.

Such natural landscape features as the St. Lawrence and Great Lakes waterways system, the humid environment of Southern Ontario, and its mixed forest vegetation are basic to the understanding of current industrial locations.

The theme of the research has a dual purpose: to apply the so-called principles of industrial location to this early period; to locate accurately, by geographical methods, early industrial regions.

In the year 1933, Professors Harold Innis and Arthur Lower published a monumental volume, "Select Documents in Canadian Economic History 1783–1885." About eighty years prior to this, William Smith, a famous traveler, with a keen sense of geographic perception, published a valuable record of the economic and social life of Upper Canada. A few years later Canada's first census for the year 1851 was issued. With the aid of these rich sources, countless histories, documents, and county atlases and field work, an attempt has been made to reconstruct the geography of manufacturing industries in Southern Ontario for the early period.

EARL E. LACKEY (Introduced by Stephen S. Visher)—*Mountain Passes in the Colorado Rockies.*

On the highways over the Rockies in Colorado are numerous passes over which millions of people travel every year. Among the best known are Fall River and Milner passes on U. S. Highway 34 in Rocky Mountain National Park; Berthoud and Rabbit Ears passes on U. S. 40; Loveland and Vail passes on route 6; Ute, Twin Creek, Wilkerson, Trout Creek, and Tennessee passes on U. S. 24; Agate and Monarch passes on U. S. 50; and La Veta and Wolf Creek passes on U. S. 160.

The physiographic diagram of Colorado indicates relative ruggedness but does not show sufficient detail to locate the passes. The state highway map marks more than fifty passes; by a numbering method, their names and altitudes are given on the margin. Altitudes are indicated graphically by the relative lengths of vertical bars.

The major object of this paper is to call attention to some possibilities for vacation activities among the scenic Colorado Rockies. A map showing traffic flow over transcontinental highways indicates that U.S. highways 40 and 50 are not nearly so intensively used in Colorado as are U. S. 30 through Wyoming or U. S. 66 through New Mexico. Graphs showing traffic flow by months indicate that because of their snow the high passes in Colorado have a marked influence on the seasonal nature of travel and transportation.

BEN F. LEMERT—*Paricutín.*

Paricutín, Mexico's youngest volcano, is still erupting violently almost five years after its birth. Lava now covers an area of 16 square miles in a region where corn,

sugar cane, cattle and goats, and woodworking furnished the Tarascan Indians their livelihood. The lava continues to spread over the land. Molten rock pushes out from the side of the cone. Eruptions occur at frequent but irregular intervals.

The Tarascans who made their living in the valley around San Juan Parangaricutiro watched with despair as the masses of hot rocks and cinders covered their fields and homes. Now they are happy and contented. Back from the volcano where the ash fall was only a few inches deep the land is producing better crops than ever before. Much of the forested land that looked dead is now green. Except close to the volcano, few trees were killed. Those that are dead still have wood in them that can be used in the woodworking industry. At the edge of the lava the Indians have erected huts in which they serve food and drink to the crowds of tourists that come to watch the volcano from a safe lookout point three or four miles away. Other Indians rent their horses and act as guides in conveying the tourists to the lookout point. The tourists provide a market for the wooden carvings, furniture, and novelties manufactured by the natives. By these activities the income of the Indians is much more than it was before their lands were devastated. Even the city of Uruapan enjoys a share of the improved economy. They still need a better road to the volcano.

E. WILLARD MILLER.—*Some Aspects of the Mineral Position of Eight Principal Industrial Nations.*

The vast industrial expansion of modern times would not have been possible without a corresponding increase in the output of the basic minerals. Mineral production has been increasing rapidly for over 100 years and there is no indication that a peak has yet been reached. Modern mineral exploitation began and developed most rapidly in the eight industrialized countries—United States, Great Britain, Russia, Belgium, France, Germany, Italy, and Japan. These nations today consume 85 per cent of the world's mineral output and produce over 80 per cent of the manufactured goods of the world.

It is, therefore, appropriate to examine the trend of mineral production in these eight industrial nations. In a survey from 1925 to 1945 of seven basic minerals—coal, petroleum, iron, copper, lead, zinc, and aluminum—the following statements and trends were obtained. Coal, the principal source of industrial energy, was produced in varying amounts in each of the eight countries. Totally they produced about 85 per cent of the world's output. Petroleum is found in large quantities in only two of these major industrial nations—the United States and Russia, who furnish about 75 per cent of the world's total production. Iron-ore production in the eight nations averaged 77 per cent of the world's total. The industrial supremacy of these nations is explained largely by their abundant resources of coal and iron ore. Of the basic minerals, copper and lead are being rapidly depleted in the industrialized nations and their production has declined from about 60 per cent to a little more than 40 per cent of the world's total. These nations produce over 70 per cent of the zinc, largely as a result of their control of the smelter capacity.

Aluminum has grown rapidly in importance in recent years with the eight nations producing over 70 per cent of the total. Great Britain, once the world's leading source of minerals, is today important only in the production of coal and iron and in these is experiencing an absolute decline. The United States is still the world's leading producer of minerals but is declining relatively as new foreign areas come into production. Russia began to exploit her minerals on a large scale only recently and her relative position as a producer is increasing in almost all basic minerals. France, Germany, Italy, Belgium, and Japan have limited mineral resources and must import a large percentage of their needs.

Thus, these eight leading industrial nations, with the possible exception of Russia, are rapidly consuming their highest quality mineral resources. Mining methods are becoming more difficult and lower-grade ores are being used. If these eight nations are to maintain their present industrial supremacy they must be assured an adequate supply of these basic minerals. Each of these countries is acquiring mineral concessions in the nonindustrialized areas of the world to bolster domestic supplies. The economic and political plans for this struggle to secure basic raw materials are already well formulated. The competition will become more intensified as the mineral resources of the industrialized countries are further depleted.

G. ETZEL PEARCY (Introduced by John K. Rose)—*Evolution of the Domestic Air-route Pattern.*

The objective of this paper is to show that the air-route pattern of the United States is geographically sound, even though its development has been based on factors only indirectly oriented toward geographic principles. Over the country during the last thirty years there has developed a complete network of air routes. Each state has one or more air stops, and every important arterial of surface travel for any appreciable distance has its counterpart in the sky. In addition, air routes may link cities and geographic regions in a manner not practical by surface means.

Prior to the Civil Aeronautics Act of 1938, air routes sponsored by the Post Office Department were inaugurated and maintained for carrying mail. At first planes were operated by the government itself, but later contracts to fly the airmail routes were awarded to private enterprises. Most of the early air companies were small, often operating but a single route between two cities. Passengers, originally excluded from the flights, later were reluctantly tolerated, and eventually accepted as the principal element in air traffic.

After 1938 the newly created Civil Aeronautics Board controlled the route pattern of the country. All of the existing routes were retained, but new ones were, and still are, granted only at hearings at which individual organizations present their applications to the Board for decisions. New routes are certificated upon the principle of an airline proving the need of a particular route in the interest of public convenience and necessity and showing how such a route can best be served by that airline.

The resulting airline pattern represents the outcome of a complex legal procedure. Evidence in support of the new routes themselves is based upon economic criteria, largely statistics from government sources and data from exhaustive traffic surveys. But this material is frequently secondary to the necessity of maintaining a balance among the competing air carriers. Nevertheless, the actual route structure adheres to a pattern of maximum utility to American economy. Past experiences of both the applicants and the Civil Aeronautics Board are instrumental in slowly adding only those route segments that are economically strong. The Board exercises great care in avoiding undue competition over any route, its decisions against new routes outweighing manyfold its favorable decisions.

Numerous characteristics peculiar to the field of air transportation are further indications of how the overall route pattern stands up under geographic analysis. Routes have been developed because of a community of interest between two areas. The conception of air "gateways" has evolved, whereby traffic is focused upon favorably located air centers. "Feeder" airlines are a response to the question of expanding the traffic potential of important air centers. Integration of all the airlines of the nation into one gigantic system permits traffic to flow smoothly from any point in the country to any other. These are but a few of the aspects of commercial aviation which bring forth interesting speculation from the standpoint of geographic interpretation.

MALCOLM J. PROUDFOOT—*The Isle of Mull: A Geographical Reconnaissance.*

The Isle of Mull, an eroded mountainous remnant of tertiary basalt, is separated from Scotland by a narrow sound. The predominant basalt was heavily gouged and rounded by Pleistocene ice sheets. Soils are relatively well drained, fertile, and suited for pasture to the mountain tops, and for hay, oats, turnips, and potatoes on the restricted level portions.

Progressive population migration, chiefly associated during the nineteenth century with the sheep-farm enclosure movement, reduced the number of inhabitants from 10,538 in 1831 to 2,903 in 1931. The Crofters' Holdings (Scotland) Act of 1886 was an attempt to stem the tide. However, either landlords evicted the unprofitable crofters before they were thus protected, or the crofters departed of their own free will to seek more attractive opportunities overseas. Today, land holdings predominantly from 2,000 to 10,000 acres in size are being tenant- and manager-operated.

Mull has daily steamer service from Oban on the Scotch mainland to its three principal ports of Craignure, Salen, and Tobermory; a few other ships carrying tourists during the summer; a trading vessel calling at irregular intervals at Bunessan; and several small ships calling to buy wool. Telephone service to Oban provides essential communication with the outside world.

The inhabitants of Mull earn their livelihood from the summer tourist trade; sheep, dairy and subsistence farming; and reforestation work. Commercial fishing is notable by its absence. Approximately 10,000 British and Scotch tourists annu-

ally visit the island between May 15th and October 15th, staying in some 10 hotels and inns. Tourists are attracted by the beautiful sea and mountain scenery; the excellent fishing and shooting; the convenient bus and ferry service to historic Iona; unsurpassed hiking, cycling and swimming; and plentiful local supplies of fresh food.

The 3,255-acre Ardnacross Farm located on the Sound of Mull was examined in greater detail. Ardnacross was a thriving sheep farm during the nineteenth century. Today, it is in process of rehabilitation and conversion; with 2,750 acres of rough sheep pasture; 400 acres of cattle pasture; and 105 acres devoted principally to hay and secondarily to oats, turnips, potatoes, and a woodlot. In addition, Ardnacross has 460 black-faced sheep, 28 Ayrshire dairy cattle (to be developed to a maximum of 60 milch cows), and 2 horses. Milk from this dairy herd, supplemented from an adjacent farm, supplied approximately one-half of the needs of Tobermory.

Two reforested areas, totalling 1,952 acres, owned by the Forestry Commission of Scotland (1,234 acres in Sitka spruce alone), provided employment for approximately 50 men. Reforestation difficulties are: resentment at the encroachment of forest use on "more productive" pasture and arable land; high cost of fencing to keep out rabbits, sheep, and deer; and fire hazards, particularly those resulting from the burning of heather by sheep farmers.

ALLAN RODGERS—*Wartime Changes in China's Iron and Steel Industry.*

At the onset of the Sino-Japanese War in 1937, China had an iron and steel industry whose productive capacity by Western standards was relatively low. Pig iron potential totaled about 800,000 tons annually, including nearly completed plants, and steel capacity totaled approximately 150,000 tons. However, of this small development over 90 per cent of the blast furnaces and most of the steel mills were idle. During 1936 and early 1937, the Chinese government planned extensive expansion of the steel industry and a number of new plants were nearing completion in North China. With the Japanese invasion in 1937, the Chinese government succeeded in salvaging only a modest amount of equipment which was moved into the interior or by barges on the Yangtze and other rivers.

By 1944, the picture of the steel industry had changed considerably. In Free China, with its modest start and some foreign aid, the Chinese government had succeeded in creating only a very small development, barely sufficient for even minimum needs of the area. This industry operated under exceedingly primitive conditions, and production lagged far behind capacity. Total pig iron production reached at a maximum less than 100,000 tons of which only 30 per cent was produced by modern furnaces. Steel production similarly was very small and at a maximum never totaled much over 15,000 tons annually.

Meanwhile in Occupied China, Japan under forced draft had created a relatively large iron and steel center consisting of many small blast furnaces concentrated predominantly in a number of centers in North China. Capacity here totaled almost one and a quarter million tons of pig iron annually, including furnaces nearing completion. Steel capacity was relatively low, never totaling more than 125,000 tons. The

predominant emphasis on pig iron can be attributed to the urgent need for this product in the steel furnaces of the homeland. Production of iron and steel in Occupied China lagged far behind capacity, with pig iron production never totaling more than 190,000 tons annually. However, the significance of this development lies not in its productive record during the war, but in the relatively modern equipment made available to China, particularly to North China, for future industrialization. This, in turn, is dependent on the outcome of the civil war now in progress and any damage that may be incurred in the conflict.

EARL B. SHAW—*Mexico's Foot-and-Mouth Disease Problems.*

Foot-and-mouth disease, one of the most contagious and widespread diseases attacking cloven-footed animals, offers a challenge to United States-Mexican control in Mexico. Normal annual importation of a half-million Mexican cattle has been discontinued pending eradication of the disease. United States quarantine against cattle shipments from Mexico deprives that country of a good market, and removes opportunity to augment the sharply limited United States meat supply.

In view of the importance of and danger to the United States livestock industry, Congress has already appropriated millions of dollars to aid Mexico's fight against the disease. Personnel, equipment, and supplies have been sent to Mexico. Both Mexico and United States technicians agree that so-called cures and vaccines have no place in the present disease-eradication campaign. It seems possible that present efforts towards disease control may prove successful in time. In case the present campaign is unsuccessful, quarantine against Mexican cattle will continue, a border fence may be built, and Mexico will seek new markets for surplus beef in European countries where foot-and-mouth disease is endemic.

LEWIS F. THOMAS—*The Decline of St. Louis as the Metropolis of the Middle West.*

Although St. Louis was founded nearly sixty years before Chicago, today Chicago is the greatest city in the Midwest. There have been several factors involved in this shift of significance. Much of the explanation has been concerned with the water-level route from Chicago to the port of New York.

One significant aspect of this water-level route is that it worked both ways, thereby establishing the basis for the lowest transportation rates between the Atlantic Seaboard and the Middle West.

The barrier effects of the Mississippi River were more important for St. Louis than Chicago, and thus Chicago became the lowest-cost distribution point for points west.

The development of the Mississippi-Warrior River barge lines during World War I has had adverse effects on St. Louis in contrast to Chicago. One such effect has been enhanced prestige for Memphis. As a focal distribution point for goods in Arkansas and Oklahoma, Memphis cuts in on a segment of territory dominated by St. Louis trade interests.

The inland waterway and the Atlantic-Gulf waterway development brought the Galveston-Houston center to a high competitive significance as compared with St. Louis, diverting much trade away from the latter city.

As a consequence of these various infringements, St. Louis' commercial life has been restricted to a relatively small area, about 150 miles in radius.

When one considers the economic geography of the present St. Louis area, one can realize that its potentials do not indicate much possibility of intensified development. These factors which have favored Chicago more than St. Louis have been similarly involved in relations between Chicago and the twin cities, St. Paul-Minneapolis. The result has been the enhancement of Chicago as the great super-city of the Middle West.

Commensurate with the great commercial development of Metropolitan Chicago, there have been great developments of transportation, financial, manufacturing, and cultural features. As a consequence there is in Metropolitan Chicago an ever-enlarging scope of diversified activities on an ever-increasing scale. It appears to substantiate a parody on a Biblical verse which reads:

> To him that hath, Shall be given
> And from him that hath not, Shall be taken
> That which he has.

EDWARD L. ULLMAN—*The American Railway Pattern: Traffic and Facilities.*

Although the circulatory of transport system is basic to geographical study, the geography of land transport is almost unknown compared to other earth features. Extreme difficulty in obtaining adequate data explains most of this neglect, particularly for American railroads, our most important transport media. Railroads normally carry from 50 to 60 per cent of the total freight of the country.

On the basis of confidential traffic-flow data and recently reported track information, two series of maps have been prepared, indicating quantitatively major characteristics of the American railway pattern.

Freight-traffic-flow maps show in broad outline the following:

1. Areas of density in the following order:

(a) A climax area including the industrial belt, as might be expected, with the addition, however, of a contiguous zone in the Appalachian coal fields extending from southeastern Kentucky to Norfolk.

(b) A secondary, and much less important, net in the midcontinent area from Minnesota to Louisiana and Texas, with heavier movement and a primarily west-east direction, in the northern half, and south-north movement preponderant in the lighter-density south.

(c) Least density in the deep southeast, and particularly the intermountain area and some contiguous Great Plains, west to the Pacific.

2. Highest freight-density lines in the following order:

(a) Pennsylvania Railroad from Pittsburgh area to Philadelphia and New York.

(b) Chesapeake and Ohio and Norfolk and Western from coal fields of West Virginia to Columbus, and beyond; eastern Appalachian portion of Baltimore and Ohio.

(c) New York Central through the Mohawk Corridor.

(d) About fifteen other stretches almost as important as New York Central, virtually all, save the short Mesabi iron-ore roads, in the climax area.

Heaviest transcontinental density is on the Union Pacific, across Wyoming; heaviest Canadian traffic is between Winnipeg and Port Arthur-Fort William (reflecting wheat movement); neither route, however, approaches the density of leading lines in climax region.

Companion maps indicate capacity and use, dividing lines into six categories, based on number of tracks and presence or absence of signals. Correlation with freight-density maps is close, except on lines with exceptionally high or low passenger traffic.

Among the conclusions it appears that although railway routes are influenced both by production and topography, the former is probably more important than past emphasis would indicate, especially when considered on a situational (regional) basis in contrast to a site (local) basis. Thus the Pennsylvania Railroad has far more traffic over the mountains than the level New York Central. The effect on routes of coal (mined chiefly in mountains and accounting for one-third of United States rail tonnage) is particularly evident.

KATHERINE THOMAS WHITTEMORE (Introduced by Carol Y. Mason)—*The Development of Power from the Niagara River.*

In October, 1947, industrial users of electricity along the Niagara River were asked to reduce their consumption of power. The crisis was precipitated by drought that lowered reservoirs and affected hydroelectric plants in other parts of New York State. However, the major cause of the power shortage was the increased demand which the power companies had not been able to meet by increased facilities.

This power shortage focused attention on several problems. Should permanent increase in the diversion of water from the Niagara River be permitted? Is the water now diverted used as efficiently as possible? The purpose of this paper is to provide a part of the background needed in considering such questions by surveying the present methods by which power is developed along the Niagara River.

The treaty of 1909 between the United States and Canada permitted the diversion of 52,500 cubic feet per second from the Niagara River. During World War II, additional diversions increased the amount by 28,500 cubic feet per second. A weir built across the Canadian Channel made this increase possible without noticeable decrease in the flow over the falls.

The water diverted from the river for power is divided among six power plants along the river. Of these, three are located above the falls, two in Canada and one in the United States. These are of the pit type. The effective heads in these stations are about 140 feet.

Two other plants, of the more conventional type, are located near the falls, one American and one Canadian. The effective heads in these plants vary from 180 to 215 feet. The newest of the hydroelectric plants utilizing the power of the Niagara River is located near the end of the Niagara Gorge. Its intake is several miles above the falls. The available head at this station is 304 feet.

Shortly after World War I the increasing demand for power was met by the construction of a steam plant on the Niagara River. It has been enlarged once and a new addition will be completed in 1948.

Attention has turned again to suggestions for more efficient and more complete use of the power of the Niagara River. One suggestion is for the utilization of power in the rapids below the falls. Another is a one-stage development by which the water would be taken from the river north to the Niagara Escarpment where a head of approximately 315 feet could be obtained.

Future development depends not only on the line of greatest efficiency but also on the resolving of the conflicts among conservationists and power interests, the advocates of public ownership, and the private power companies.

GEOGRAPHERS AND THEIR WORK AND WORKS

CARLETON P. BARNES—*Synthesis of Research at Fixed Points for Predictions Based on the Geographic Pattern.*

Experimental field research on problems of agriculture, forestry, and engineering must inevitably be carried out on plots or fields so small that they may be regarded as points. Their results remain virtually without meaning until we know to what larger areas they apply. This requires scientific correlation of the environments where the experiments were conducted, with the geographic pattern of environments in larger areas. Thus experimental field research must be accompanied or preceded by geographic classification of areas in terms that enable the research results to be extended.

The soil type or phase is a landscape unit of rather uniform environmental character. Patterns or associations of these units make up the larger and environmentally more complex areas, and determine their character.

As experiments are made and trials are run we learn more and more about the response of these basic environmental units to different uses. But there remains the problem of giving this knowledge prediction value for areas where a pattern of associated soils will be used in complementary fashion—farms, communities, economic regions. This is a problem of applying geography to the extension of research findings. It involves the geographer's thorough acquaintance with the environmental patterns that characterize areas and with the characteristics of the individual components of the pattern.

LLOYD D. BLACK (Introduced by J. Norman Carls)—*Troll's Critique of Geographical Science in Germany from 1933 to 1945.*

Erdkunde, the first German geographical periodical to appear since the war,

features a 25,000-word article by Professor Carl Troll (University of Bonn) on German geography during the Nazi period. Published in May, 1947, the article is subtitled: A critique and justification. Troll states that two years provide sufficient perspective for an appraisal of geography from 1933 to 1945. In most respects Troll is quite fair in judging his colleagues. Nevertheless, there persists a mild impression of "whitewash." Unquestionably this article was written for external consumption.

In Part 1 Troll discusses the influence of Nazi doctrines upon geography. Human and economic geography were more affected than physical geography.

A rather comprehensive survey of geographical agencies is presented in Part 2. Conspicuous for their absence are war agencies such as Mil-Geo and Mar-Geo.

Five pages are devoted to geopolitics, which Troll calls a generic and later a degenerate offspring of geography. Troll reports that eventually *Geopolitik* became so self-evidently ridiculous that the geographic profession no longer feared disgrace.

The concept of geography as a science is summarized in three pages.

Part 5 concerns the field work of German geographers on foreign countries before and after 1933. Of the 310 footnotes in the article, 236 relate to Part 5. They represent an excellent listing of German publications, 1933–45. Although a majority of the works were published before the war, it is surprising to note the great number published while the war was in progress and which had no relation to the war effort.

Part 6 is entitled "Research Goals and Results in the Separate Fields of Geography." It will appear later.

Troll has published a useful review of German geography 1933–1945, despite a definite bias. It is recommended that a translation into English be made and published along with one or more detailed critiques by American geographers.

GEORGE B. CRESSEY—*The International Geographical Union.*

American participation in the International Geographical Union is through the Division of Geology and Geography of the National Research Council. The Department of State provides for the annual dues, currently amounting to about $250. Meetings of the Congress normally occur at four-year intervals, with the next session set for Lisbon, Portugal, in September, 1948. Attendance is open to all geographers interested. Previous meetings of the Union have been held in Amsterdam (1939) with 1,000 geographers present of whom 45 were Americans; Warsaw (1935) with 700 members from 44 countries; and Paris (1931) with 600 in attendance from 46 countries.

Members of the National Committee for the United States are: George B. Cressey, Chairman (Syracuse), John Leighly (California), Otto E. Guthe (Dept. of State), Samuel Van Valkenburg (Clark), Arthur Robinson (Wisconsin), Wallace W. Atwood, Jr. (Research and Development Board), G. Donald Hudson (Northwestern), Edwin J. Foscue (Southern Methodist), John K. Wright (American

Geographical Society), Isaiah Bowman (Johns Hopkins), and Richard J. Russell (Louisiana).

WILMA B. FAIRCHILD (Introduced by Gladys M. Wrigley)—*Explorers: The Men and Their Motives.*

A perusal of some forty-odd explorers' "lives" leads one to the conclusion that the majority of such biographies, although they may be adequate from a literary standpoint, fall far short of the ideal as measured by the geographer's yardstick. A clear and comprehensive narrative of the explorer's journeys is of course important and should be accompanied by adequate maps. But more than that, the biography should include the general and personal circumstances leading up to the subject's career; it should interpret as far as possible his character and personality, giving a rounded appraisal of the man himself, neither overlooking his faults nor exaggerating his virtues. Most important, perhaps, an ideal biography should bring out the relationship between the subject's journeys and earlier explorations in the same regions, showing the consequences and value of his work and including a critical evaluation of the data acquired.

The biographies under consideration fall generally into one of three categories. A great many of them are *factual,* concerned primarily or exclusively with the external events of the explorer's life. A few of them are *fictional,* in the sense that the thoughts, feelings, and even the words of the subject are set forth, yet no documentation is provided. Some of the books are *interpretative,* giving a mature and thoughtful analysis of the man and his work. These last most nearly approach the ideal.

RICHARD HARTSHORNE—*On the Mores of Methodological Discussion in American Geography.*

Methodological discussion in American geography is influenced by certain unwritten rules of what is proper or what is improper in oral arguments or in published studies. Judging from practice, all geographers recognize the importance of methodological questions and express their individual views on occasion, but many question the value of discussing such questions with each other.

Many regard such questions as appropriate for oral discussion, or as personal statements, but not appropriate for scholarly writings to be subjected to critical examination. Consideration of the results of both methods leads to the opposite conclusion: the most rapid progress toward a common understanding of sound methodology in geography is to be expected from the application of responsible scholarship to the problems concerned.

Similarly, a common view that methodological writings should not be taken as seriously as substantive writings, is opposed by a principle that the former require standards of scholarship no less exacting than those expected in substantive works. The extent to which it is appropriate to subject a methodological paper to critical analysis is not to be determined by the degree of importance the original author may

have attached to the paper when he wrote it or subsequently, but rather by the degree of importance that the paper itself has attained in the thinking of geographers.

One of the most widely accepted rules in methodological discussions is that while it may be desirable to seek an answer to the question What is geography, it is not proper to apply the answer arrived at to any specific study by a geographer, when asking "Is this geography?" Any student seeking orientation in the field and a basis for classifying substantive works will inevitably apply whatever concept of the field he adopts to specific substantive works, but such application of the concept is of proper concern only to him and hence is not appropriate as a basis for criticizing the works of other students. There is no authoritative concept of the field. On the other hand, in methodological discussion of different concepts of geography, it may be both appropriate and desirable to utilize specific substantive works, either to illustrate or demonstrate the conclusions of the theoretical discussion. Great care is required both by the writer and the reader not to abuse the purpose for which the specific studies were examined by attempting to draw conclusions as to the admissibility or inadmissibility of specific works in the field of geography.

Many of the objections raised against methodological discussions reflect concern over the reputation of persons rather than concern for the validity of writings. Scholarship is not concerned with writers but with writings, but what scholarship says about writings is of concern to the writers. This difficulty, inherent in any kind of critical reviewing, is for various reasons intensified in methodological discussion. Consequently all parties to methodological discussions, including the readers, are under a special obligation to focus their attention on writings rather than on persons, to maintain the tone of the discussions on the impersonal level.

One custom among American geographers has been followed so consistently over decades as to have become, one may hope, a compelling social law; namely, that methodological discussion, even if it appears to represent disagreement between persons, is not a basis for personal enmity or schisms in the field.

CHARLES Y. HU (Introduced by O. E. Baker)—*Some Basic Problems of Geographical Research on China.*

The paper is a summary statement concerning the problems of collection, selection, evaluation, and effective use of basic Chinese source materials for geographic research. It is based on the author's experience of studies and analysis of 2,170 Chinese articles, 5,600 sheets of Chinese large-scale maps, climatic data covering 652 stations, and hundreds of aerial and ground photographs pertaining to the area. Special emphasis is placed on the problems of utilizing these data for research on physical geography of China, including topography, climate, and soils.

Intensive and detailed topographic studies on small-unit areas of China by Chinese investigators are few indeed. The major sources of information are confined to the numerous monographs and articles published by the China National Geological Survey and some provincial surveys. An analysis of the publications of these organizations for the years 1916 to 1940 resulted in a selection of 412 such outstanding

studies. Major problems for speedy and effective use of these materials are: (1) the sketchy and widely scattered character of the topographic data contained therein (for these studies are primarily for geological purposes); and (2) the lack of large-scale topographic maps and the difficulty in locating and identifying many physical features described.

There are, at present, at least 10,000 sheets of large-scale maps, ranging from 10,000 to 300,000 in scale, covering most parts of China, particularly along the coastal areas. Because of the lack of cooperation among mapping agencies, numerous inconsistencies make the joining of sheets of different provinces extremely difficult. Other major difficulties for utilization of these maps include: (1) diversified systems of vertical datum measurement adopted by different surveys; (2) poor horizontal control; (3) lack of grid lines or corner coordinates on many sheets; (4) uneven draftsmanship; and (5) bad printing and poor legibility.

Chinese meteorologists and climatologists have made steady and notable progress in the study of the climate of that country during the past twenty years or so. There are available for the first time climatic data covering the largest number (652) of stations distributed through various parts of China. The effective use and proper interpretation of these data are, however, handicapped by: (1) short period of most records; (2) uneven geographical distribution of stations; (3) lack of data covering sufficiently long simultaneous periods for comparable studies; (4) varying quality and reliability in the methods of data-recording and the improper location of some stations; and (5) meager and incomplete knowledge of air-mass movements of the area.

A careful analysis of the publications of China's Soil Survey for the past fourteen years (1929–43) has resulted in a selection of 98 outstanding studies (including both reconnaissance and detailed surveys) by Chinese workers. These studies are confined to a few areas of north and south China, particularly the Wei-Fen valleys, the North China Plain, and some parts of Kwangtung and Szechuan. During the war years, since 1939, numerous excellent detailed surveys were conducted by Fukien, Hunan, and Kiangsi provinces. The still extreme small number of such studies, however, plus the lack of large-scale soil maps, seriously hampers research in this connection.

ROBERT S. PLATT—*Can We Avoid Determinism?*

Determinism of some sort persists even though environmental determinism in a strict sense is a dead issue. An example of determinism in social science is found in the common practice of offering to explain human geographic phenomena by reference to a set of causal factors, natural and cultural.

Actually such an approach fails to explain and tends to mislead. The so-called causal factors, picked to fit corresponding events, furnish merely an ex-post-facto rationalization, omitting whatever seems inconsistent with the apparent results.

A deterministic approach, either to explain the present and past or to predict the future, is unsound and unscientific, whether or not an assumption of free will be

adopted. In scholarly work there are clear-cut advantages in not claiming to find cause and effect where this claim is misleading, in making explicit whatever underlying assumptions are taken for granted, and in seeking accessible answers to appropriate questions.

Human geography deals with "perceived similarities and differences" between areas and traces "co-variation" in space, thus approaching explanation in the only scientific way. Such questions as the following are appropriate: What phenomena are observed? In what association of space and time? Under what conditions or circumstances? What patterns are discernible and what correlations? For the future what alternative possibilities appear within what known frame?

We can and had better avoid determinism as a pseudo-scientific sanction of vulgar belief in the inevitability of war or depression or any prospective event. There are alternative possibilities. Geographers have a chance to point them out.

LESTER W. TRUEBLOOD—*Employment of Geographers in the War Effort* (A Report of the Joint Committee of the Association of American Geographers and the American Geographical Society to Survey the Work of Geographers in the War; John B. Appleton, Chairman).

To be published later.

STEPHEN S. VISHER—*A Study in Social Geography.*

A study of where various recognized American leaders were born, schooled, and employed, with some correlations with environmental influences.

GEOMORPHOLOGY

GEORGE B. CRESSEY—*The Face of New York.*

Land forms are best described by slope and local relief. The major categories are flat and rolling plains, plateaus, hills, rounded and rugged mountains, and escarpments. Flat plains are nearly featureless. Rolling plains have relief which is measured in tens of feet and slopes to 5 degrees. Plateaus are dissected plains, that is, areas of low relief locally cut by steep valleys or bordered by an escarpment. Hills and mountains are slope lands, primarily differentiated by relief which amounts to hundreds of feet with the former and thousands with the latter. Hill slopes are usually 5 to 10 degrees, while rounded mountains average 10 to 20 degrees, and rugged mountains exceed 20 degrees. Hill slopes may exceed those of mountains; the criterion is relief.

The chief contribution of this paper is a detailed map of land forms. New York is a state of hills, with 80 per cent of its surface in this category. Some of these hill lands are submountainous, as in the Allegheny area of southwestern New York; elsewhere drumlins merge with rolling plains. Level land occurs along the St. Lawrence; south of lakes Erie, Ontario, and Oneida; along the upper Hudson, on Long Island, and as flood plains along the Susquehanna tributaries. The Catskills

and Adirondacks stand out as proper mountains, with rugged landforms in parts of the latter.

Within New York are 8 major and 32 minor landform regions, as follows:

Erie-Ontario Lowlands	Erie Lake Plain
	Ontario Lake Plain
	Southern Ontario Plain
	Ontario Drumlins
	Oneida Lake Plain
	Ontario Ridge and Swampland
	Eastern Ontario Plain
	Black River Valley
St. Lawrence-Champlain Lowlands	Champlain Lake Plain
	St. Lawrence Marine Plain
	St. Lawrence Hills
Adirondack Highlands	Adirondack Mountain Peaks
	Adirondack Low Mountains
	Western Adirondack Hills
Hudson-Mohawk Lowlands	Mohawk Valley
	Hudson Valley
	Walkill Valley
	Shawungunk Mountains
	East Hudson Hills
New England Uplands	Taconic Mountains
	Hudson Hills
	Manhattan Hills
Triassic Lowland	
Atlantic Coastal Lowlands	Harbor Hill-Ronkonkoma Moraines
	Long Island Outwash Plain
Appalachian Uplands	Cattaraugus Hills
	Allegheny Unglaciated Hills
	Finger Lake Hills
	Susquehanna Hills
	Catskill Mountains
	Helderberg Hills
	Delaware Hills
	Tug Hill

GEORGE F. DEASY—*Landform Regions of Manchuria.*

The major landform divisions of Manchuria include a vast Central Lowland, surrounded by a rim of mountains consisting of the Southwestern Highlands, the Greater Khingan Mountains, the Lesser Khingan Mountains, and the Eastern Highlands. Beyond the circle of mountains are two peripheral divisions—the Western Plateaus and the Northeastern Lowlands.

While each of the major landform divisions possesses a certain degree of topographic unity within itself, they nevertheless are characterized by surprising internal diversity of landform patterns. These differences permit subdivision of the major divisions into smaller landform regions.

The Central Lowland is subdivided into seven regions. Three are well-drained, flat plains; one is a marshy, hill-studded plain; two are essentially hilly areas, with flat lands limited to river plains; and one is a region of sand dunes and sand ridges, with extensive marshes.

Four landform regions comprise the Southwestern Highlands. One is a narrow, interrupted, flat coastal plain. A second region is a low-mountain area of fragmented ridges, with very broad valleys and basins. Long, continuous, parallel, east-west trending ridges, separated by equally long and continuous, narrow river plains comprise a third region. The fourth region consists of high, fragmented ridges, with flat lands limited to short stretches of narrow river plain between gorges.

The Greater Khingan Mountains are divided into four landform regions. These include a low northern massif; a central zone of linear ridges and valleys; a southern zone of high, basin-studded mountains; and a western fringe of foothills.

The lesser Khingan Mountains consist of three regions, including a basin-studded high-mountain area in the southeast, a central zone of linear hill ridges and valleys, and a northwestern hilly region without definitely oriented ridges.

Eighteen distinct regions compose the complex Eastern Highlands, including six mountain sections, six terraced intermontane basins, two plateaus, a zone of foothills, two coastal plain areas, and a group of coastal islands.

Finally, the peripheral portions of Manchuria have been divided into two plateau regions in the west and three marshy lowland plains in the northeast.

All of the above regions are delimited on the basis of observable surface landform patterns; no cognizance has been taken of morphological processes involved in the formation of the landform features.

The great influence of landform patterns on agricultural, industrial, transportation, and military activities within Manchuria becomes obvious from a study of landform regions of the country.

SUPRAKAS GHOSH (Introduced by John K. Rose)—*The Nature of the Bhagirathi River (India)*.

The nature of the Bhagirathi River, the westernmost channel of the Ganges Delta and on which stands the port of Calcutta, has been the subject of some controversy. The problem is whether the Bhagirathi is the main course of the Ganges, or whether it was a later formation, or whether it is an artificial channel. The conclusion of this paper is that up to the sixteenth century A.D. the Bhagirathi was the original course of the Ganges. It is possible that a minor creek was in existence since the time of Christ, marking the modern course of the Padma, the present main channel of the Ganges in its deltaic stage. After the sixteenth century, due to various direct and indirect causes, the Ganges left its original main channel through the Bhagirathi and flowed down eastward, excavating the present Padma. Since this eastward diversion, the Bhagirathi has progressively deteriorated. If this process of deterioration of the river continues unchecked, the prosperity of the port of Calcutta will be seriously jeopardized in the near future.

JOHN E. KESSELI—*Correlation of Pleistocene Lake Terraces and Moraines in the Great Basin.*

Discoveries of artifacts in Pleistocene lake terraces of the Mohave Desert and the possibility of further finds in similar locations have revived interest in the accurate dating of these terraces. Up to now age determinations of these features have been quite uncertain and have been based on field observations of the relation of lake terraces and moraines gathered by G. K. Gilbert and I. C. Russell in the eighties at the mouth of five canyons of the Wasatch Mountains near Salt Lake City and of two canyons of the Sierra Nevada near Mono Lake. Neither of the two writers arrived at definite conclusions concerning the absolute age of the former lake terraces although their general Pleistocene age could be established. Since that time the number of recognized glacial stages in the western mountains has increased from two to four, and the highest conspicuous Pleistocene terrace in the different lake basins has become assigned to either the last stage, that is the Tioga (Mankato or Late Wisconsin), or to the next older stage, Tahoe (Iowan or Early Wisconsin). New evidence encountered on Leevining Creek now permits a definite dating of some Pleistocene levels of Mono Lake in terms of the generally accepted age determination of Sierra Nevada moraines. The age of the conspicuous high terrace located approximately 650 feet above present-day Mono Lake could thus be determined as late Tahoe (late Iowan). The lake level of Mono Lake of the Tioga stage (Mankato) was found to have remained 120 feet below the level of the conspicuous high lake terrace deposited at the end of the preceding stage.

No comparable field evidence permitting a definite correlation of the Bonneville and the Provo levels of Great Salt Lake with moraines of the Wasatch Mountains was found in the canyons south of Salt Lake City. The relation of terrace gravels and moraines at the mouth of these canyons lends some support to an extension to this area of the age correlations established at Mono Lake.

ARMIN K. LOBECK—*Glaciation and Present-day Transportation Routes in Alaska.*

Glaciation in Alaska resulted in vast gravel deposits which filled the major river valleys to depths of one hundred to four hundred feet. These deposits have since been dissected and now extensive remnants remain as high terraces sloping imperceptibly down the valley. Hundreds of miles of the well-known Alaska Highway and other Alaska highways are located upon these terraces, in both Alaska and Yukon Territory. The Alaska Railroad for much of its length of over 450 miles is similarly situated. Likewise, almost all of the numerous airplane landing fields are on the high terraces or on the deltas to which they lead. The deltas of the large Alaska rivers, dating from glacial time or derived from glacial drift, embrace tens of thousands of square miles of muskeg and marshes with interlacing tortuous channels, meandering streams and ox-bow lakes. These lake-strewn areas are totally impassable in summer except by boat along the largest rivers. Only in winter can they be traversed. Thus the dog sled has become, even with the white people, the outstanding method of travel for shorter distances in these delta lands. Road build-

ing and railroad building are almost out of the question under such conditions. The airplane, therefore, has become the chief means of linking the remote Arctic and Bering Sea regions with the interior. For such great distances as that from Nome to Fairbanks, for instance, the dog sled is impracticable.

Virtually all of the cities of Alaska are situated on delta or outwash deposits of glacial gravel. Anchorage on the Matanuska Delta, Seward, Skagway, Juneau on the delta of the Mendenhall glacier, and Fairbanks on the plains of the Tanana River system, are examples. The little settlements and trading posts, however, are situated close to the streams themselves upon their modern valley floors below the high terrace levels. Whitehorse, on the upper Yukon, is thus located, whereas the Alaska Highway and the Whitehorse airport are on the uppermost terrace overlooking the town.

Gravel is universally used for roadbuilding in Alaska with the result that roads and towns are everywhere fearfully dusty and uncomfortable. Where the highways cross the major rivers they descend from the terraces to the floodplain level. Here long wooden trestles and embankments traverse the gravel stream bed with its numerous interlacing channels. In times of flood these trestles are habitually washed out so that on frequent occasions during the early summer the highways can not be used even for days at a time.

In spite of the handicaps just mentioned, as well as those of the severe winter season, roads are maintained throughout the year. But until there are more roadside accommodations and service stations, it will not be practicable to permit the motoring public in general to enter Alaska by road.

RICHARD J. LOUGEE (Introduced by Samuel Van Valkenburg)—*A Giant Waterfall of the Glacial Connecticut River at East Haddam, Connecticut.*

In 1928 the writer found evidence from varved clays and glacial deltas near Hanover, N. H., indicating sudden drainage of Glacial Lake Hitchcock in the Connecticut Valley when the ice front stood at Lyme, N. H., 10 miles north of Hanover. The lake waters subsided 90 feet in central New Hampshire and Vermont, giving place to a new lake (Upham) controlled by ledges near Turner's Falls, Mass., but in central Massachusetts and Connecticut they fell 150 feet, exposing the lowest parts of the lake basin, and initiating the post-Glacial Connecticut River. The lake, which extended 157 miles from Lyme to Middletown, drained in a single year. Although the cause has remained conjectural, it was suspected due to escape from temporary ledge control in the Connecticut River Gorge below Middletown.

Inspection of the recently published Deep River Quadrangle map now reveals the long-sought control point of Lake Hitchcock at East Haddam, Conn., 12 miles below Middletown. If the tilted Hitchcock shore lines are projected southward from 657 feet elevation at Hanover, they reach a theoretical elevation 75 feet above present sea level at East Haddam and Tylerville. It appears that the 80-foot delta terrace which was deposited against the ice front in Tylerville, originally was spread

eastward completely across the gorge to the 110-foot granite Nathan Hale Hill in East Haddam, thereby obliterating the pre-Glacial course of the Connecticut River, and diverting drainage eastward around the hill.

Earliest currents around Nathan Hale Hill connected waters north of the delta with those of a water body to the south into which the delta was built. But when the ice receded to Middletown a regional land uplift caused lowering of water levels south of East Haddam. Then the Tylerville delta became a dam, retaining Lake Hitchcock, and the overflow east of Nathan Hale Hill developed falls with height increasing as the waters to the south subsided. Beyond a rock threshold at 70 feet present elevation, the overflow descended a cataract of Niagaran height to levels perhaps as low as the known rock floor of the gorge, 104 feet below present sea level.

Evidence at East Haddam Falls indicates that after blockading the valley for some 4,000 years, as recorded by varved clays, the Tylerville delta was somehow cut through, abruptly releasing Lake Hitchcock and permitting the newly born Connecticut River to intrench far below present sea level. Today the site of the great falls is at least partially buried in windblown sand, and more than half of its height has been submerged by recent rise of sea level, but its rôle in late-Glacial history is one which vitally influenced the physiographic development of the Connecticut Valley from Long Island Sound to Canada.

WILLIAM E. POWERS (Introduced by G. Donald Hudson)—*The Cary Glacial Substage in Illinois and Wisconsin.*

The Tazewell glacial substage, formerly called Early Wisconsin in Illinois, was followed by glacial recession and deep erosion of the drift. In Cary time the glacier again advanced from the Lake Michigan basin, first building the Minooka moraine in Illinois and impounding Lake Minooka farther North. The Valparaiso morainic system lies inside Minooka Ridge at the south, but overlaps the Minooka and all of the Tazewell moraines south of the Illinois-Wisconsin boundary. In Wisconsin the Valparaiso is correlative with the Darien moraine of the Lake Michigan Lobe and apparently also the Johnstown or outermost moraine of the Green Bay Lobe.

Crossing striae in the Cary gray drift area of Wisconsin indicate a shift of dominance from the Lake Michigan to the Green Bay Lobe. The latter lobe, in Cary time, developed the great drumlin field of southeastern Wisconsin.

Withdrawal of the glacier ended Cary time and ushered in the Forest Bed Subinterval. The first, highest stage of Lake Chicago (Glenwood Stage) was followed by low water during which an evergreen forest grew in the Lake Michigan area. The indicated climate was cooler than today, though not glacial. Next came a glacial readvance—the Mankato Substage—during which a red drift was deposited on top of the gray. This glacial episode was feebler than the Cary, because red drift does not occur south of Milwaukee, nor east of the Niagara Cuesta which the Mankato glacier barely surmounted near Fond du Lac. The outermost red drift forms the Port Huron moraine in Michigan, the Valders in eastern Wisconsin.

RICHARD J. RUSSELL—*Channel Patterns along the Poised Mississippi River below Cairo.*

When the Mississippi flowed southward in the broad valley west of Crowley's Ridge its channel patterns were those of a braided stream at least as far south as central Louisiana, where they may be observed on the surface. After diversion through Thebes Gap the river, in combination with the Ohio, attained a poised condition in which three main types of channel pattern developed: (1) reach, (2) meander, and (3) entrenchment. These patterns are related chiefly to the materials encountered locally by the channel along its bed.

ANASTASIA VAN BURKALOW (Introduced by John K. Wright)—*Valley-floor Slopes.*

In the semiarid Great Plains many valley floors are compound, their cross profiles approaching concavity. From relatively flat areas near the streams—typical flood plains made by lateral planation—they rise in gentle slopes, here called valley-floor slopes, toward the valley wall on either side. It has been suggested by Davis, discussing this type of feature in general, and by Frye and Smith with special reference to the Great Plains, that such valley-floor slopes are formed by the weathering back of the valley walls in a fashion similar to that postulated by Lawson and Bryan for the retreat of mountain fronts and the formation of pediments in arid regions. According to this hypothesis the main stream has had little to do with the widening of the valley floor, for its activities have been restricted to the relatively narrow strip of flood plain in the center of the valley. An alternative possibility, however, is that the main stream has, by its own lateral planation, accomplished all of the widening of the valley floor, and that the margins of its flood plain have later been covered by coalescing alluvial fans.

If valley walls weather back, tributary and main valley floors should gradually approach the same width, for the postulated processes of slope retreat would be independent of the size of the stream. This is not true, however, of lateral planation. In a given length of time a small tributary can never plane laterally as widely as can its main stream. Since tributaries cannot, except locally, reach grade and start lateral planation earlier than the main stream, their valley floors can never become as wide as those of the latter. Examination of topographic maps shows that this relationship is the general rule.

According to the hypothesis of valley-floor widening by lateral planation, the entire valley floor, including the alluvial-fan deposits of the valley-floor slopes, should be underlaid by a stream-abraded rock floor, on which rest flood-plain deposits. If the valley walls retreat by weathering, these features would be present only under the central flood plain. The valley-floor slopes would be underlaid by residual soil, grading down into an indefinite and irregular rock basement. A cross section of the valley of the South Platte at Brule, Nebraska, based on well records, appears to support the former hypothesis.

Since in semiarid regions flood-plain deposits are a very important source of ground water, the possibility that they are present under the valley-floor slopes is

a matter of much practical importance, and further field study of these features, including test drilling, is very desirable.

JOSEPH E. WILLIAMS (Introduced by John B. Leighly)—*Some Aspects of Chemical Weathering at Low Temperatures.*

This paper is a continuation of observations begun in 1941 in the San Gabriel Mountains on the causes of nivation depressions. Apparently these depressions were caused by meltwater from snow banks disintegrating soluble bedrock and peripheral mechanical weathering. During 1947 field work was continued in the Cascades where the asymmetry of many ridges and heavy snow drifts on the north-northeast slopes might indicate that chemical weathering at low temperatures could be a major cause of such landforms.

In the Snoqualmie Pass region of the Cascades many streams on the northeast side show longer stream gradients than on the southwest side. Northern valley slopes have nivation depressions, amphitheatres, and cirques. Southern valley slopes show few of these features. Pleistocene glaciers were thick in the valleys but thin along the ridge crests. They may have worked on pre-glacial symmetric or asymmetric ridges leaving the problem of asymmetry still to be explained.

Heavy snowfall and west-southwest winds pile huge drifts on the northeast slopes of these ridges. Meltwater and rainfall passing through these banks have a temperature of approximately 32° F. As water cools, the rate of gas absorption increases rapidly so that carbon dioxide and oxygen is brought into the water. This meltwater does not freeze under the thirty foot drifts and continues to do chemical weathering. After thin snow around the bank melts off, this outside area remains relatively inactive. Further, the meltwater beneath the snowbanks acts as a medium of transport for soluble and hydrated materials. This deepens the nivation depression and more snow accumulates the next season to step up the work of chemical weathering. Finally enough meltwater collects in the depression to break over to form a ravine connection to the valley below. In this case a nivation depression grows into a valley amphitheatre. It is distinguished from the cirque by the thin spurs that nearly close the exit.

If such a valley amphitheatre were formed in pre-glacial time it could fill with ice sufficiently to do the work of cirque formation. The spurs would be removed from the exit and a moraine would likely appear instead. If the work is done in post-glacial time the land form remains a valley amphitheatre. Thus chemical analysis of meltwater suggests a sequence of deep snow banks, nivation depressions, valley amphitheatres, and cirques with one of the important agents of weathering being meltwater.

HISTORICAL GEOGRAPHY

HENRY BRUMAN—*The Culture History of Mexican Vanilla.*

The vanilla plant is a climbing, perennial, epiphytic orchid whose native habitat is tropical rain and scrub forests in southern Mexico, Central America, and northern

South America. The morphology of the flowers makes self-pollination impossible. In the wilds a few seed pods are commonly produced per plant through insect pollination. The seed pods, which resemble large string beans, develop the characteristic vanilla odor after being dried and cured.

Some vanilla was used in pre-Columbian Mexico for flavoring and medicine. When hot chocolate became popular in New Spain and Europe the demand for vanilla increased greatly. In the seventeenth century it was gathered in Guatemala, Chiapas, and Tabasco by Indians who sold it to itinerant traders. In the eighteenth century the source region shifted northward, and for the past 200 years the main producing area in Middle America has been the Totonac country of Veracruz, with Papantla as its chief focus.

Documents in the Mexican archives indicate that the shift from gathering to planting vanilla was made by the Totonacs about 1750 in response to increased European demand. In the 1840's a technological revolution occurred when the Totonacs learned how to pollinate vanilla flowers by hand. This technique was introduced by French colonists at Jicaltepec on the Nautla River after one of their number learned of Morren's successful experiments in the hand-pollination of orchids at Liege in the 1830's. This innovation increased and stabilized production, and also made possible the introduction of vanilla culture into the Old World tropics.

Because of its recent commercial origin, vanilla culture is not ritualized among the Totonacs. It is purely an economic activity, vanilla being their main cash crop. Green vanilla is sold by the Indians to wealthy townspeople, often descendants of nineteenth-century French or Italian immigrants, who do the processing and exporting. Papantla alone has seven large patios where vanilla is dried. The Indians take most of the risks, and the exporters most of the profits. Enough return comes to the Indians, however, to allow them to buy fine silks for their women and gold caps to adorn their teeth. Because of vanilla the Totonacs may well be the most prosperous group of Indians in Mexico today.

ANDREW H. CLARK (Introduced by John B. Leighly)—*Legend and Fact in Historical Geography: An Illustration from Nova Scotia.*

Most American geographers must have encountered the story of the Lunenburgers on the southern coast of Nova Scotia somewhat east of Halifax. In this place 1,500 Calvinists from northwestern Europe, chiefly the Palatinate, were unceremoniously dumped in 1753. Whatever they knew of the land came out of the background of the western European peasant which must have included a long tradition of plant and animal husbandry. They can have known nothing of the ways of the sea.

The Lunenburgers became within a century one of the foremost communities of the Atlantic Coast in the skills necessary for success at fishing, sailing and shipbuilding. Writers began to point to them as an almost perfect example of the triumph of habitat over cultural habit, of the rapid work of nature's lathe in turning a square peg for a round hole. Certainly one must admit that the soil, vegetation,

and climate were immediately unfriendly to the sort of agriculture they knew, and that, on the other hand, they were in possession of excellent ice-free harbors fronting on one of the most prolific of the world's fishing grounds. If the assumption that the Lunenburgers did turn their backs to the land had been correct, the illustration would have been one of textbook patness. It would gain still more validity from comparison with the migration of people from the same, or neighboring, European areas at about the same time to the western banks of the Delaware where, favored by nature, model agricultural communities were established.

The whole point of these remarks is that the assumption is incorrect. Lunenburgers also developed a kind of agriculture which, in relation to its environmental difficulties, was as much of an achievement as that of the Pennsylvania "Dutch." Indeed there have been periods when Lunenburgers were much more interested in the land than in the sea. Moreover, the two interests of the community have not been harmoniously blended and we must speak of an unstable balance, or of a swinging pendulum, rather than of a well-knit, diversified areal character. This discussion may help to correct the notion that an agrarian people, who have contributed at least as much to the agricultural development of Nova Scotia in two centuries as any other local group of its size, abandoned farming to embrace the fisheries at the firm beck of the environment.

EDWIN J. FOSCUE—*Historical Geography of the Estes Park Area of Colorado.*

The Estes Park area of Northern Colorado, occupying a small mountain basin east of the Continental Divide, is drained by the Big Thompson River and its tributaries.

Although explored by trappers as early as 1840, no attempts to settle the area were made until Joel Estes came to the park about 1860 to establish a cattle ranch. As the winters were colder than he desired, Estes soon sold his few holdings and moved southward. In 1872 an Englishman, the Earl of Dunraven, came to the park. It appealed to him as an ideal hunting preserve and he immediately began to homestead as much land as possible. He also built a large hotel to care for his guests. About that time Abner Sprague and other pioneers reached the park and upon realizing Dunraven's aims began securing their own lands to block his monopolistic efforts. Dunraven continued to operate the hotel, but being unable to control all lands in the basin ultimately sold his holdings. Several other pioneer resort hotels were established in the park between 1872 and 1907 when F. O. Stanley built the hotel bearing his name and began operating a fleet of Stanley Steamers over the newly constructed automobile roads into the park.

Other early occupations in the region in addition to ranching and the resort business included logging and lumbering to supply local building needs, and sporadic prospecting for metals. No minerals in paying quantities were found in the Estes Park area and this protected the terrain from the destructive exploitation of the mining industry, so common in much of highland Colorado. Some metallic ores were

found in the Never Summer Range to the west, and mushroom towns such as Lulu City and Dutchtown sprang up but were soon abandoned.

Several of the pioneers, realizing the resort possibilities of the area, began agitation for a portion of the high country to be set aside as a national park, and in 1915 this was accomplished by the establishment of Rocky Mountain National Park.

The village of Estes Park (incorporated in 1917), lying about a mile east of the entrance to Rocky Mountain National Park, is the chief market center for this large resort area. It reflects its resort interest by shifting suddenly from a small village to a crowded bustling city with the coming of summer, and changing back again at the close of the tourist season.

HUMAN GEOGRAPHY

GEORGE F. CARTER—*Man at La Jolla.*

At La Jolla, California, there is a remarkably complete and lengthy record of man's occupance of the New World. Evidence for man begins at the base of alluvial fans built out toward a former sea margin that was some distance seaward of the present beach. The alluvial fans, now truncated, contain buried soil horizons, some of them showing mature development. The fans are now capped by a mature soil with a B horizon that seems out of place in the present climate of the region. Further evidence for early man is to be found in a raised beach ridge now one-fourth mile inland and 25 feet above the present sea level. All of these features suggest a late Pleistocene age for the materials. A cultural sequence based on implement typology agrees with the temporal sequence suggested by the physical geographic considerations.

A possible reason for the presence of such a clear and continuous record of early man at this place is thought to lie in the relation here of a steep coast to a submarine canyon that closely approaches the coast. This juxtaposition has created a condition of such a nature that fluctuations of sea level do not change the lateral position of the sea margin by any great amount. This has led to the accumulation within a narrow zone of a long record of early man's occupance of the sea margin.

ROBERT E. DICKINSON (Introduced by George B. Cressey)—*Rural Settlements in the German Lands.*

Since the publication of Meitzen's classic work in 1895, a vast amount of research has been undertaken on rural settlements in the German lands, and especially important in recent years have been the contributions of geographers trained in the techniques of the medieval historian. It is now possible to generalize for these lands as a whole in respect to the morphology of the rural habitat.

The first areas of Germanic tribal settlement were located in the forest-free areas of the west-German lands, where the irregular compact village with the three-field system gradually developed. In the heathlands of the northwest, the earliest form of settlement was a group of separate farms cultivating in common one large arable

field (*Esch.*); individual settlement in the surrounding heath and marsh began at an early date. In southern Germany forest clearance was effected largely under the guidance of high authority in small hamlets or villages, either with the three-field system or with a modified system with individual fields in private ownership. The isolated farmstead is normally a secondary dispersion from the nucleated settlement, effected during and after the Middle Ages, and is to be associated with the presence of numerous scattered patches of cultivated land, the predominance of pastoral economy, and the laws of inheritance that varied from State to State.

In the east-German lands, where German colonization took place after 1200 A.D., the original Slav settlements were either eliminated or absorbed and transformed by the Germans, although many settlements reveal traits of the original Slav form. This was a small group of farms with arable land divided into irregular separate fields. The Germans brought two main types of village settlement, the three-field system with a compact *Angerdorf* or *Strassendorf* (with which may be included the Slav *Rundling* that was adapted in planned forms by the Germans); and the settlement in cleared forest or in drained marsh in which the holding (*Hufe*) is a long strip with the farm directly in contact with it (*Waldhufendorf, Marschhufendorf*). The great age of rural land settlement ceased at the end of the Middle Ages.

EDWARD HIGBEE (Introduced by George F. Carter)—*Occupance in the Peten.*

From time to time it is suggested that sparsely populated rainforest regions of the American tropics might be suitable for the settlement of agricultural colonists. The Yucatan Peninsula is among the regions considered. Reference is made to the agricultural history of the Tikal area in the northeastern Peten of Guatemala. Approximately a half-million Mayans practicing subsistence farming are believed to have inhabited this region some 1,600 years ago. Most of the soils are shallow and relatively infertile, yet they were no handicap to the Maya. His land requirements were less than 1 acre per year per capita. With much more land available for cropping than was used in any one year, the Mayan farmer probably practiced a long rotation. Two to five years of cropping were conceivably followed by a decade or more of forest cover on the lands beyond the outskirts of Tikal. The forest-cover crop when burned for clearing provided wood-ash fertilizer to stimulate crop growth. This conservative rotation was capable of sustaining a large population in the vicinity of Tikal for centuries.

The modern colonist would presumably not be satisfied to live a subsistence existence comparable to that of the ancient Maya. If he hoped to produce surpluses for sale, he would have to compete with farmers of other regions whose soils are capable of continuous clean cultivation. He would want to clear his land of stumps and to keep his fields in continuous crop production without allowing the forest to return. Such efforts on the shallow and comparatively infertile soils of the Peten would lead to failure. The Maya, who had no large urban population to feed nor foreign markets to supply, was not tempted to engage in such practices.

In the humid lowland areas of the American tropics, except on good soils of alluvial or volcanic origin, the agricultural practices of the Maya appear better adjusted to soil conditions than those of the modern commercial farmer. Soil investigations should precede any serious colonization proposals.

FRANK LEUER KELLER (Introduced by Raymond E. Crist)—*Finca Ingavi—A Medieval Survival on the Bolivian Altiplano.*

Finca Ingavi, occupying 1,500 acres of level agricultural and pastoral land, is located within 35 miles of the southern shore of Lake Titicaca at an elevation of 13,000 feet. This estate is representative of the dominant land-tenure system which was established by the *conquistadores* at the expense of those communal Indian holdings which were most productive. Although today landed estates and Indian communities are approximately equal in number, the estate, by reason of its favored economic position and the high social status conferred on its owner, controls the agricultural economy of the region. The *colonos,* tied to the estate by custom, are required to till land for the benefit of the owner in return for the rent-free use of a small parcel of agricultural land. Inasmuch as the owner is absent from the estate most of the time, an administrator has unlimited control over the Indian inhabitants. Rigorous climate and immature soils limit the variety of highland crops to those few which have been developed to withstand the hostile growing conditions, namely, potatoes, *quinoa,* barley and *cañagua.* Sheep are grazed for wool and meat, while cattle are maintained for fertilizer and some milk. Important by-products are cheese and *chuño,* the desiccated potato of the *Altiplano.* Agricultural methods are a combination of primitive pre-conquest and colonial practices with resulting stagnation of the economy of the entire nation. In order to provide an adequate livelihood for those who depend directly on the *finca,* steps must be taken to increase the yields by the introduction of modern agricultural techniques. Agrarian reform whereby the *colono* can gain fuller, more permanent possession of the land will aid in solving the critical social problem.

RAYMOND E. MURPHY—*Land Ownership on a Micronesian Atoll.*

The United States now finds itself governing some hundred or more island groups in Micronesia. For most of these the ownership of the land has never been shown on a map or described in any written records, nor are there any recorded laws governing land ownership or inheritance. Yet we are pledged to govern these islands and it is unlikely that the casual methods of the past can long suffice. Mokil, an atoll in the eastern Carolines, is a good example of the problem. Boundary lines are numerous on Mokil and are well known to the people, but they have not heretofore been shown on any map. Nor have the facts regarding land ownership and inheritance been recorded in writing.

In the study here presented the boundaries of all property holdings on Mokil were mapped through pacing and the use of a Brunton compass. Then the recent

land histories of several families were recorded in order to find how land had changed hands in the last half century, and details were obtained regarding all unsettled land-ownership disputes. Finally, certain principles or customs of land ownership and inheritance were derived.

A few of the more important customs or principles are listed by way of illustration: 1. Land cannot be bought or sold on Mokil. 2. The landholding unit is the patrilocal extended family, and the name shown on the map for the various pieces of land belonging to such a group is that of the "bossman" of the family who is generally the oldest man. 3. When a girl is married she goes to live with her husband's family, and her own family gives her title to one or more pieces of coconut and breadfruit land and to several rows of taro. 4. Before the bossman of a family dies he indicates who is to be the new bossman and how the family land is to be divided. The family may either (a) remain a unit under the new bossman or (b) divide into nuclear families each of which is the beginning of another patrilocal extended family.

Though no two atolls are exactly alike in their land ownership customs, yet some sort of grouping or classification seems possible. Thus, Pingelap and Ngatik, in the eastern Carolines, appear to present no fundamental contrasts to the principles developed for Mokil. On the other hand, in most of the Marshall atolls matrilineal inheritance prevails and in some the King retains title to all of the land. It is suggested that a classification of Micronesian island groups on the basis of the customs of land ownership and inheritance not only would be feasible but should prove of immense value in administration of the islands.

DONALD PATTON (Introduced by Derwent Whittlesey)—*Studies of Rural Settlement in Europe.*

European geographers have used a number of general classifications, both descriptive and genetic, for rural settlement patterns in Europe. The classifications most in use differentiate only two or three basic patterns of settlement. A large number of more detailed, specific classifications have been formulated, however, for settlement patterns in single countries or parts of countries. Many of these classifications, based directly on field work, list important settlement patterns which are not represented in any way in the general classifications.

As a result of the considerable disagreement between the general and the specific classifications for rural European settlements, the principle of a general classification based more fully on the facts is suggested.

The principle of the general classification may be stated quite simply. Settlement patterns at least of (1) dispersed farmsteads, (2) compact villages, (3) open, diffuse villages, and (4) hamlets should be differentiated, as well as all settlement patterns formed by the intermixtures of two or more types of rural settlement.

Intermixtures of different types of settlement do not merely form transitional zones between areas each containing but one type of settlement; they themselves

form core areas. Yet none of the categories of the existing general classifications could describe these areas adequately.

Thus a classification is needed to generalize the complexity of European rural settlement patterns without oversimplification. Other aspects of settlement, such as the sizes and shapes of compact villages, are important details; yet they should not be allowed to overburden a general classification of rural settlement patterns.

Clear recognition of the basic general patterns of rural settlement and their distribution is a preliminary necessity in the study of rural settlements.

DONALD F. PUTNAM AND L. G. REEDS—*Population Shifts in Carleton County, Ontario.*

Carleton County contains the city of Ottawa which is the capital of the Dominion of Canada. From a small city of 20,000 engaged primarily in the lumber trade, Ottawa and its environs have, in eighty years, grown to have a population of more than 200,000. It is but natural that the growth of such a metropolis will have had decided effects upon the distribution of population within the county. Although an area of no great relief, Carleton county comprises a number of distinct landscape areas. The western portion consists of flat plains of Beekmantown dolomite covered by a few inches of drift. In the north other areas of shallow soils are found on Nepean sandstone and on Black River and Trenton limestones as well as one low ridge of Precambrian rock. In the eastern part the bedrock is hidden by a considerable depth of drift. There are areas of till, including some well-formed drumlins, in the townships of North Gower and Osgoode, but by far the larger area is floored by sand, silt, and clay deposited in the Champlain Sea during the Pleistocene period. Studies of population densities reveal that, in the eastern part of the county, a more-or-less zonate pattern exists focused upon the city of Ottawa, while in the west population distribution is almost completely under physiographic control. Rural population as a whole has declined. While much of this is due to abandonment and increase in size of farms, a great deal of it is due to the loss of tradesmen and storekeepers from the rural hamlets. Many of the latter have entirely disappeared, although the larger villages have maintained about the same level of population. Their functional significance has altered greatly, however, because of the dominating influence of the commercial center of Ottawa.

DERWENT WHITTLESEY—*The Eurafrican Urban Settlement.*

The much-discussed "impact of Europe on Africa" finds its most striking expression in the urban centers that Europeans and Africans jointly occupy and operate. The functions of these centers always include trade and worship, often mining or administration, and sometimes manufacturing or education.

But whatever the functions, the form is the same, consisting of a European part, nearly always containing the commercial core, separated by a broad belt from the quarters for Africans. The separating zone may be wasteland, gardens, playing

fields, or cemeteries. The complementary settlements thus separated contrast strikingly in architectural forms, in size and spacing of buildings, and in the surface of streets and yards.

This type of Eurafrican settlement dates from about 1900. A widespread and common species is the mining camp. The mining companies have been compelled to build living quarters for African labor as well as European management. They usually locate the African "compound" and the European town on opposite sides of the ore body, it being the element that fixes the new settlement.

Some mining camps have been overlaid with trade and manufacturing not primarily associated with the mining operations. Africans who work downtown or in the European residential area must find living quarters where they can. Probably a large majority live with their families in suburbs called "locations." Locations range from neat municipal housing to squatter towns of makeshift materials.

Almost as simple as the single-function mining camps are the centers of European administration that have sprung up throughout interior Africa. The Europeans live in comfortable houses strewn over a rolling landscape, and work in conveniently located buildings. African farm villages are scattered about, but they focus on a market place and shops at a node of routes.

In the Sudan, walled cities existed centuries before the Europeans arrived, their inhabitants being engaged in both trade and handicrafts. They have been left as partners to recent European settlements placed outside the walls and at a safely sanitary distance. The business of the European towns is primarily overseas trade.

Eurafrican urban settlements differ greatly in functions and in natural environment, but all share the conspicuous feature of physical separation of European from African districts. Obvious justifications are sanitation and the minimizing of racial clash. The peculiar form of the urban settlement expresses the paramount aspect of contemporary life in Black Africa—juxtaposition and joint endeavor of two widely disparate societies.

PLANT GEOGRAPHY

A. W. KÜCHLER—*Synthesis of Vegetation Maps.*

Map scale and degree of generalization depend on the purpose of the map and the measure of accuracy required. The content should be uniform although this is difficult, as natural, seminatural, and cultural types of vegetation cannot always be singled out objectively.

Many studies in biogeography are very detailed, using large-scale maps, and permitting individual plant species to be shown. The value of such maps is limited to highly specialized investigations. In all other instances, geographers should avoid specific and generic names. The vegetation map of the United States in the Atlas of American Agriculture is excellent, but if vegetation maps of Africa or India were based on the same method, they would be incomprehensible to most geographers.

World maps are compiled from large-scale maps, covering small areas. Hence much importance is attached to these basic maps. Their usefulness depends on

sound vegetation analysis, and Burt Davy, Chipp and others have done important work in this field. The major weakness of the work of these men is that it is based on the vegetation of certain areas, such as central Africa or Guiana. "The Geographic System of Vegetation" (*Geographical Review,* April, 1947) offers a uniform method of presenting vegetation in all parts of the world and on maps of any scale. This system is also highly effective in training students in observation.

One of the major problems of drawing vegetation maps of continents is the lack of accurate information. Generalizations cannot be made from maps of the size and scale of topographic sheets. Maps already much generalized are open to various interpretations. In the end, one can only hope to draw a vegetation map which is admittedly very imperfect, and which must be constantly revised as more information becomes available. For the intelligent interpretation of vegetation maps it is necessary to consult maps showing soil, climate, and topography.

PEVERIL MEIGS—*Lianas of the Eastern Woodland.*

Lianas constitute a significant element not only of the tropical rainforest but also of the eastern woodlands of the United States. Such vines as grape, honeysuckle, poison ivy, and Virginia creeper occupy an important and sometimes even a dominant place in the landscape. Vines have been mentioned from earliest times to the present, but their rôle in the woods often has been slighted or misinterpreted. Honeysuckle, for example, far from being harmless, is able when well established to completely prevent the growth of young trees and develop sizable blighted areas.

POLITICAL GEOGRAPHY

S. W. BOGGS—*Geographic Techniques in Political Science.*

The greatest evils that afflict and threaten mankind spring from political conflict. Two hundred years ago there had never been any world problems, and none were anticipated. Today the world is full of world problems.

The effects of science and technology have been more direct and automatic upon economic and social activities than upon political development. Until recent decades the interests and activities of the individual and his family were often circumscribed within less than 1/10,000 of 1 per cent of the earth's surface. Today the area in which the needs of millions of people are met and events of vital importance occur embraces, for each individual, millions of square miles. The contrast in areas of interest and concern, for a particular community and function, is frequently comparable to the difference in size of an oyster and an octopus on a four-foot globe.

The study of changing geographic patterns of political, economic, and social activities is peculiarly significant to political science because political society is unique in that it embraces every individual within given boundaries. New techniques are needed, and a few are suggested, to analyze these highly mappable historical changes of social patterns, and to help take up the tragic lag in the social sciences, especially in political science.

Three geographical suggestions are offered in relation to political thinking: (1) that the study of man as a political and social animal be made world-wide, including societies in which Aristotle's influence is unknown; (2) that area limitations of each human activity and each political function be studied separately, at different dates and in many regions; and (3) that each political function for each selected date be studied, wherever feasible, from the standpoint of the individual in society, and that of governments as to variations in effectiveness under different technological conditions.

Experimental types of study are suggested, each involving different dates for the same community or region, geographic factors and contemporary technologies, and comparisons between regions.

1. With reference to individuals and local groups of people: (a) direct personal contacts—e.g., travel, number engaged in migratory labor; (b) indirect individual contacts—by mail, telegraph, radiotelephone; (c) services vitally affecting the local group—e.g., geographical sources of food and clothing, public health, education, labor and employment, recreation facilities; (d) obligations and duties of the individual to government and to non-governmental organizations; (e) group and community interests and needs in relation to distant areas—e.g., markets and sources of materials.

2. With reference to government (town, city, province, nation, international organization), the area of operation in relation to each function: (a) variations in effectiveness; (b) degree of centralization or decentralization, and effects upon local community and individual; (c) joint exercise of a function by several states, as by multilateral treaty; (d) relation to non-government organizations.

JOHN E. BRUSH (Introduced by Glenn T. Trewartha)—*India Divided.*

The political conflict of Muslims, Hindus, and Sikhs in India has focused attention upon the socio-religious differences of these groups and their geographic relationships. The census of 1941 enumerates some 386 million members of religious communities in all India of which about 66 per cent are Hindu, 24 per cent Muslim, six and a half per cent Tribal, and one and a half per cent each, Christian and Sikh. A measure of the relative numbers and the pattern of distribution of the major groups is presented by a series of ratio maps for the whole country and dot maps for the areas of greatest complexity.

Hinduism prevails in the closely settled parts of the southern coastal plains, the Deccan highlands, and most of the Ganges valley. In the central and eastern hill tracts partially assimilated aborigines form a large proportion of the population, but this heterogeneous collection of animistic tribes can not be considered a social or religious entity. Islam has the largest numbers of adherents in the Indo-Gangetic plains but Muslims comprise more than half of the population only in the Ganges Delta and the Indus watershed. In the eastern Punjab and much of the Ganges and Brahmaputra valleys they form a minority of one-fourth to one-tenth. The Sikh homeland lies in the eastern Punjab between Delhi and Lahore but even here they

are less than half the inhabitants. Christians are widespread but only in Malabar do they constitute a significant fraction of the whole.

The term religious community, as used here, denotes a group drawn together by common belief and custom, but aware of economic and political interests. The Hindu-Muslim schism, while resting on fundamental religious differences, results primarily from the Muslims' belated response to economic changes brought by British rule and their fear of Hindu domination in an independent India. Areas separated under the Pakistan scheme in Bengal and the Northwest are delineated by administrative subdivisions (districts) in which Muslims formed a majority in 1941. Important minorities remain on both sides of the boundary, however, and only five-ninths of Indian Muslims attain national autonomy by the division. In the bisected province of Punjab communal warfare is precipitating mass exchange of population which will eliminate Hindu and Sikh minorities from western Pakistan.

The inhabitants of the Muslim areas depend almost exclusively upon agriculture. In the eastern zone high density of the nonindustrial population will create a serious problem unless food imports and emigration can be maintained. The western section has a better position because of food surplus and unused irrigable lands. Important cash crops have been jute in the eastern delta region and cotton along the lower Indus. Mineral resources of Pakistan are very meager but development of potential hydroelectric power will permit some industrialization.

SAMUEL T. EMERY—*The Anachronism of the Small Nation.*

The small nation is an anachronism in the commercial world of today. It is no longer an efficient unit for autonomy either in peace or war, nor does it serve effectively the buffer function for which many small states were created or have been preserved to the present. The small buffer state has, in fact, become dangerous to world peace in that it invites aggression by a powerful and unscrupulous neighbor which may doubt whether the opposite powerful neighbor will commit itself to war to preserve the small buffer.

The small state could perhaps end its anachronism by committing itself with all its wealth to a commonwealth of nations. By so doing, it might create a common pool of wealth which would lend substance to the confederation and attract larger powers to it. The small nations hesitate to give up their autonomy, fearing that they will lose their identity in a great confederation. It would appear, however, that they would not really be giving up very much of intrinsic autonomy, since under present world organization, their independence of action is largely through the sufferance or self-interest of great neighbors and since local autonomy could, presumably, be maintained in any confederation of nations whose organization was influenced by the small powers.

ERIC FISCHER (Introduced by Sidman P. Poole)—*On Boundaries.*

The influence of political boundaries which have existed for a considerable length of time is often underestimated. They constitute one of the factors to be considered

for appropriate location of a boundary at a later moment. Besides, political boundaries seldom were maintained for long if they were not in conformity with other geographical factors. However, the importance of almost any geographical factor changes; e.g., the upper Rhine river has alternated in its separating function with the Vosges several times according to the prevailing transportation techniques of the time. Often the boundary was adjusted to this changing function. On the other hand, the Bohemian-Saxonian boundary remained static for many centuries although the forests disappeared and the gentle mountain slopes are scarcely any obstacle to modern transportation. But in the meantime a secondary boundary of human habits had developed. Other examples are cited, such as the survival in the cultural landscape of the Roman lines, of feudal boundaries, of the Upper Silesian boundary. Often political boundaries persist in a fixed location long after they have become obsolete.

Attention of modern authors has been focused largely on the replacement of boundary zones by boundary lines in modern times. But the opposite development is important too, the emergence of secondary boundaries induced by and roughly parallel to an existing political boundary. Such secondary boundaries may become more important than the original political boundary and finally supersede it. The French-Saar-German boundary and the southern boundaries of the U. S. are used as examples. Similar conditions in the Middle Ages resulted in the complicated system of dependencies of the same individual from different ecclesiastic and secular authorities. Only in the twentieth century the national state became strong enough to eradicate the last remnants of these overlapping sovereignties. Changing conditions create a different evaluation of several potential boundaries. If the question comes up it will almost always be advisable not to devise a completely new boundary, but to choose the most fitting among previously existing political boundaries, and to change only if an old boundary has become clearly obsolete. This static point of view is in strict opposition to the dynamic concept of the German geopoliticians. Their idea was that boundaries should never remain fixed but reflect the continuously changing power of states. This concept is based on a onesided stress on strategical values and cannot explain why boundaries have remained at or reverted to the same location for periods of many centuries.

NORTON S. GINSBURG (Introduced by Charles C. Colby)—*Manchurian Railways: Development and Significance.*

The railways of Manchuria more than doubled during the period of Japanese occupation from 1931 to 1945. This remarkable increase took place largely during a period of world-wide depression, but it remained in keeping with the pace set during the early stages of railway development in the country.

That Manchuria is a "cradle of conflict" has become almost a truism. That the tangible evidences of its importance as a key to political control of East Asia are its railways, particularly its foreign-built lines, remains to be indicated. The Chinese Eastern Railway, Russian-built and -owned, was completed in 1903 and

formed a great "T" running through the fertile axial core of the central lowland. The stretch from Ch'ang-ch'un south to Dairen was ceded to Japan in 1905 by which time the Japanese had completed a light railway from Antung to Mukden. British capital completed a Chinese-owned line from Peking to Mukden in 1907. Thus in 1908 there was a Russian sphere in the North, a Japanese sphere in the South, and a Manchu-British spearhead in the Southwest.

In the middle 1920's the Chinese embarked on a program of railway construction designed to outflank and emasculate the lines of the South Manchurian Railway, in charge of Japanese-owned lines since 1907. The resulting economic and political repercussions of this plan may well have led to the occupation of Manchuria in 1931 by Japan. Meanwhile, mass migrations from Shantung and Hopei provinces had resulted in settlement of the better agricultural lands.

Japan professed a desire to open up the wilderness along the margins of the country to settlement and development, but the tremendous expansion of railways which followed the occupation failed to result in any significant corresponding expansion in Manchurian agriculture. That insufficient time has elapsed in which sound judgment can be made seems possible, but before 1931 significant statistical and actual increases in agricultural production and acreage have been noted during periods equally brief. (See the maps of Murakoshi and Trewartha in the *Geographical Review* for July, 1930.)

Mineral exploitation—coal, iron, alumina, oil shales—advanced rapidly but almost entirely within 150 miles of Mukden where railway construction was at a minimum during the period of occupation.

The new 7,500-mile railway system was conceived as a means of binding a colonial dependency into an integrated arsenal and fortress which would stand both as an outpost and a supply depot for Japan's military forces in East Asia.

It is interesting to note that the two factions at war in Manchuria today are grouped along the railways in much the same manner as were Russia and Japan in 1905. The balance of power in Manchuria is suspended on the fulcrum of these early expressions of Russian ambitions in the Far East.

SHANNON MCCUNE—*The Thirty-eighth Parallel as a Political Boundary in Korea.*

New international boundaries have been established in many parts of the world since the end of World War II. Among these is one temporary boundary, the 38th parallel in Korea, which, with time, is tending to become permanently established. The line was chosen as a demarcation between Soviet and American forces demilitarizing Japanese troops. It has remained as a rigid line separating two occupation zones in which sharply divergent political, economic, and social developments are taking place.

The 38th parallel bisects the Korean peninsula. Charts and maps, accompanying the paper, reveal the physical character of the boundary. It cuts across the land without concern for land forms, climatic zones, economic spheres, or political administrations. The boundary at present functions as a rigid barrier to the free flow of

economic products and people. It serves as a rather indefensible frontier between Russian and American soldiers.

Korea has had a long history of internal unity and independence. There are, however, within Korea some physical and cultural geographic diversities. The 38th parallel rigidly maintained as a boundary will foster the growth of these differences and be a wedge to separate what has been a homogeneous nation. Even if the boundary were to be abolished immediately, there would remain scars on Korean economy and Korean social and political life. This boundary serves as an eloquent example of the use of a geographic line, a parallel, to help create chaos. Its character and function should be of concern to American geographers.

BENJAMIN E. THOMAS (Introduced by Clifford M. Zierer)—*State Boundaries and Intrastate Problems in Idaho.*

Idaho, with a rectangular southern portion and a long northern panhandle, extends the full north-south length of the old Oregon Country. The states bordering Idaho on the east and west were carved from the Oregon Country with convenient shapes and boundaries, leaving Idaho as a remnant.

Northern and southern Idaho are separated by a rugged mass of almost uninhabited mountains. North of this barrier there are three east-west transcontinental railways and two highways. And south of the mountains there is another east-west railway and a highway. But no rail lines within Idaho connect the northern and southern railways; until recently there was not even a usable north-south road.

There are also strong geographic contrasts between northern and southern Idaho. The north is humid and mountainous with mining, lumbering, and wheat farming as the main occupations. Southern Idaho is a sagebrush plain where irrigation farming and sheep raising are typical activities. These differences are accentuated by the central barrier-like mountains and the poor north-south communication. Intrastate sectionalism is strong.

Northern Idaho has often attempted to secede from the south and to join Washington or Montana. A new state consisting of northern Idaho or of northern Idaho and eastern Washington has also been proposed. Agitation for boundary changes was especially strong during the territorial period before 1890, with a few recurrences in later years.

Idaho encountered many physical, economic, and political difficulties in constructing the North and South Highway to unify the state. But the north-south distance was only partially conquered. The winding route through canyons and over mountains results in a distance of over 500 miles from the northern boundary to the state capital in the south.

The University of Idaho was located in northern Idaho to compensate the north for an earlier loss of the state capital and to promote statewide harmony by attracting students from all sections. A student special train picked up students on its westbound journey across southern Idaho, continued across eastern Oregon and Washington, and then turned back into northern Idaho. This 24-hour journey

followed the shortest rail route between southern Idaho and the university. Despite the numerous student special trains and the North and South Highway the university was still remote from southern Idaho. After prolonged sectional struggle a second four-year university was established in southeastern Idaho.

The northern attempts at secession, the North and South Highway, and the disputes over state universities are three examples of the many problems that have resulted from the formation of a state with an awkward outline, a central barrier, and sharply contrasting regions.

URBAN GEOGRAPHY

FRED E. DOHRS (Introduced by G. Donald Hudson)—*Beaver Lake, Wisconsin: A Suburban Residential Development on Recreational Land.*

In recent decades the expansion of residential areas beyond incorporated municipal limits has been characteristic of the growth of large cities. Beaver Lake, lying in the Kettle Moraine area 25 miles west of Milwaukee, illustrates a type of suburban residential development which has taken place in a natural setting of scenic beauty having the added advantage of recreational facilities.

Beaver Lake has an area of 311 acres and a shoreline of 17,600 feet. Seventy-seven per cent of the shoreline is occupied by separate houses; the balance is used by public resort hotels and a private country club. There are 81 separate dwellings which vary in size, but most are of a quality and with facilities suitable for year-round living, and compare with houses found in suburban areas occupied by the upper middle class. Ninety-eight per cent of the residents either live permanently on the lake or have winter homes in the Milwaukee area. Two-thirds of these residents live at the lake for periods from three to eight months, with a majority of these families having children of school age. The trend is toward permanent residence on the lake, and one-third of the residents remain all year. The recent increase in permanent residents is not due to the current housing shortage, but to many other factors: improvements in transport, highways, marketing facilities, communication, radio, and recreation facilities, to mention but a few.

The indications are that this is a permanent change, and that Beaver Lake will continue to grow as a year-round suburban residential area.

HAROLD M. MAYER—*Development Problems of the Port of the Delaware.*

The Port of the Delaware, consisting of the Delaware River and tributaries from Trenton to the sea, is the second port of the United States in tonnage. From fifty to seventy per cent of the traffic, however, is tanker traffic, associated with six large oil refineries on the Delaware and Schuylkill rivers. In general cargo, handled principally at Philadelphia and to a lesser extent at other Delaware River points, the port is barely retaining its competitive position.

A study of the economic and physical condition of the port, with recommendations for its development, has been begun by the Delaware River Joint Commission

under authorization and appropriations by the states of Pennsylvania and New Jersey. The Philadelphia City Planning Commission has transmitted to the Joint Commission the result of its staff study, with particular emphasis upon recommendations for locations of new terminal facilities, should the need for them be determined.

The elimination of pollution, which is so intense as to cause damage to ships' paint and hulls, is strongly recommended, and work on pollution abatement is under way. Municipal sewage is receiving first attention; Philadelphia is completing three treatment plants, but industrial wastes constitute a serious threat to the port. Philadelphia's advantage as the only fresh-water port on the Atlantic seaboard of the United States is negated by the pollution.

Despite the presence of several modern municipal and railroad marine terminals, many of the piers are obsolete in design and location. Most of those on the Delaware River in the older downtown section of Philadelphia are of insufficient size, have inadequate depth alongside, are not easily accessible to motor trucks and railroad cars because of shoreward congestion, and are not equipped for fast turn-around of modern ships. There has been a noteworthy tendency for port activities to move outward from the congested areas to northeast Philadelphia, and especially to South Philadelphia, where most of the modern piers are located, and where space is available for additional facilities. A large municipal pier is under construction in that area, which is recommended for additional facilities, if needed.

Decline in use of older piers in downtown Philadelphia, inadequacy of many of them, and impending new developments, including a national historic shrine and accompanying redevelopment of blighted commercial areas in the vicinity, lead to a recommendation for use of downtown waterfront areas for other than port purposes. An industrial express highway is to link newer port areas with commercial and industrial sections; and simplification and modernization of waterfront railroad switching facilities and operations are suggested.

Accompanying these physical improvements is need for coordination of port administrative, operational, and promotional activities, the form of which is to be recommended by the Joint Commission.

OTIS P. STARKEY—*Topographic Levels and the Development of Williamsport, Pennsylvania.*

Williamsport, Pennsylvania, provides an excellent example of how a city can change its relationships to various topographic levels. In 1795 the city was founded on one of the lower river terraces in the West Branch Susquehanna Valley. Here at an altitude of 500 feet where the well-drained Wheeling loams extend to the river banks, were traded crops and timber harvested from the 500–1000-foot levels.

About 1850 lumbermen tapped the higher levels on the Appalachian ridges (one mile south) and on the Allegheny Plateau (6 miles north of Williamsport). Logs were floated down the Susquehanna and its tributaries to a boom west of

Williamsport. The city expanded westward onto the low-lying Moshannon soils. Here giant sawmills were erected around ponds into which logs were rafted from the boom.

The denudation of the uplands diminished the potential lumber supply and intensified the spring floods. In 1889 and 1894 record-breaking floods wrecked the boom, flooded the Moshannon and Wheeling loams, and destroyed the sawmills. Soon after, the city converted itself into a diversified industrial center whose factories were constructed away from the lowest levels. New residences were constructed on the slightly higher Wheeling and Holston silt loams; with the coming of the automobile the residential area also expanded onto the hillside Berks soils.

In 1936 and 1946 record floods submerged the older parts of the city. Army engineers are now building dikes to protect the capital investment in the lowland and to permit the improvement of the run-down or deserted areas near the river. Meanwhile, residential expansion continues on the higher levels north, northeast, and south of the city. The 1000–2000-foot slopes and plateaus, which once nourished the lumber industry and are now covered with second-growth timber, serve the city mainly as hunting and fishing areas.

WARREN STRAIN (Introduced by Stephen S. Visher)—*New Castle, Pennsylvania, A City in the Second Cycle of Development.*

New Castle, Pennsylvania, is a city in the second cycle of development, according to Taylor's Genetic Classification. It is in the outwash-filled valley where Neshannock Creek joins the Shenango River, near the junction of five valleys and on the boundary between strikingly contrasted regions.

New Castle started in 1798, and by 1840 it was the junction of the most extensive canal system in western Pennsylvania. With the advent of railroads in the 1860's, New Castle became a mature industrial, commercial and political city, dominated by the steel industry. By 1940 the steel mills were gone, the tin mill was abandoned, the cement plant was dismantled, and the population had declined, giving the city definite signs of senility.

The exodus of industries has been attributed to (1) the general tendency for industry to expand westward, (2) New Castle's inability to compete with the cheap water transportation of coal in the Monongahela Valley, and (3) labor troubles.

World War II provided rejuvenation. Five factors favoring New Castle in the acquisition of war plants were: (1) excellent railroad service, (2) an abundant and dependable supply of industrial water, (3) numerous vacant factory buildings, (4) a large supply of unskilled labor unemployed, and (5) ample housing facilities. Growth has continued, and some of the large war industries have remained, converting to peacetime production. Several Pittsburgh companies have established branch factories here. In addition, many "shop type" industries have sprung up in the last two years.

Of New Castle's 48,000 citizens, 11,000 are engaged in industry. Fifty-three per cent of the workers are employed by the 26 metal processing plants, 20 per cent

are engaged in the pottery (New Castle's largest employer), 10 per cent in the three railroad shops, while the remaining 17 per cent find employment in the 50 other industries. Thus there is considerable diversification.

Heavy industries are concentrated along the Shenango River and around the edge of town, while many small shops are scattered through the commercial core and the moderate residential area. This last feature provides the characteristics of infancy. The commercial core occupies the original plat of the city while the residential areas are on the surrounding hills. Because the prevailing winds carry factory smoke and fumes away from North Hill, this has become the best residential district. Many citizens are optimistic as their city starts its second cycle of development.

Symposium: Geographers in the National Defense Program, arranged by Sidman P. Poole

COL. HERMAN BEUKEMA—*The Geographical Factor in the Study of International Relations.*

Two great American leaders have in recent months expressed their views on certain fundamental shortcomings in the training of the nation's manhood. In the opinion of General O. N. Bradley: "We can never again be even reasonably secure unless and until the Armed Forces develop corps of specialists in at least three vital fields: Advanced Technology, Military Intelligence, and International Relations." Five weeks ago, Dr. Oliver C. Carmichael, President of the Carnegie Foundation for the Advancement of Teaching, laid down his challenge to civilian higher education when he called on the colleges to exert vision, courage, and statesmanship in the expansion of their courses in international relations.

The problem presented is one which demands the earnest and continued study of the educators, whether of the Armed Forces or the civilian colleges. It is not merely that international relations as an educational discipline has not received the recognition it deserves. Even where courses are available, their value is too often impaired by the failure to insist on the student's prior completion of courses in geography and the social sciences, without which training he can only skim the surface of international relations.

At West Point this problem has been finally met in the postwar curriculum by setting up the following composite under the direction of the Department of Social Sciences:

SECOND CLASS (Junior) Year, 180 periods
Industrial and Economic Geography
History of Modern Europe
History of the Far East
Government of the United States
Contemporary Foreign Governments

FIRST CLASS (Senior) Year, 107 periods
Military Government
Economics
Applied Military Economics
International Relations

The above program was made possible by an increase of 35 per cent in the total time allotted to this field of studies. The major results of that change were the introduction of a formal course in geography and the expansion of our work in international relations. A two- or three-year test of the program will permit us to determine which, if any, major changes are desirable. In the meanwhile we are well aware that 287 periods is a scant allowance for so extensive a survey. In part that drawback is overcome by the heavy daily study demand imposed on the cadets. Inasmuch as they are juniors and seniors, it does not seem to be too heavy.

What is obvious at this early date is the unquestionable value of a course in geography as a prerequisite, not only for the study of international relations, but also for the rounded understanding of theory and practice in the separate social science fields. Our future graduates will have been given a solid foundation on which their postgraduate studies, whether in the Army schools or civilian colleges, can build in the development of the specialists sought by General Bradley. At best, however, such a plan is effective only for a minor percentage of the Armed Forces' annual intake of second lieutenants. The bulk of such recruits must in the future be provided by the ROTC. In consequence, we face the question as to how or whether this major portion of the future annual increment of young officers will secure equivalent undergraduate training. That question can be answered only through joint action of civilian higher education and the Armed Forces.

CAPTAIN H. B. HUTCHINSON—*Navy Interest in Geographic Exploration.*

Two major wars have been forced upon civilized nations through the philosophy held by the aggressors in each case: namely, Haushofer's Theory of Geopolitik. The United States, as a result, unwillingly has been displaced from its traditional position of isolation into the rôle of a world leader. Whether we like it or not we find ourselves on a World Island containing a heartland of industrial and economic resources not matched even by the old Asiatic World Island of Haushofer. An axiom of Geopolitik states that "one's nearest neighbor is one's worst enemy." The intervening regions between the American and the Asiatic heartlands are unexplored wastes of polar isolation. Modern technological advances have made the intervening distances merely great circles of the earth's surface. The Arctic Ocean bears the same relation to our world that the Mediterranean Seas bore to the world of the ancients. It behooves the Navy, therefore, to explore and discover the environmental factors of this new and now important sea in order that the Navy may impose our national policy within its environs.

HOYT LEMONS—*Geography as an Applied Science in Quartermaster Research.*

Environmental studies as utilized by the Office of the Quartermaster General in its Research and Development Program provide a noteworthy example of applied geography. The OQMG is charged with developing some 70,000 items of clothing, shelter, and subsistence for protecting the soldier against the geographic and climatic stresses of the Arctic, desert, tropics, and mountains.

The geographer's rôle is to determine the regional and temporal distribution of these stresses as they affect man's protection needs, and the issue, storage, and deterioration of QM items. As a research teammate to the geographer the physiologist analyzes bodily strains resulting from environmental stresses and lays down fundamental principles on which item development and use is based.

This basic research is termed Environmental Protection. In its pursuit, scientists in several fields work with the geographer, and associated scientists conduct library research as well as laboratory and field investigations. Maintenance of vital bodily heat at correct levels is studied in the simulated climates of the hot and cold rooms as well as under actual field conditions. Microgeographic and -climatic investigations are undertaken as type studies. Special instrumentation is necessary for both laboratory and field studies and a special Mobile Field Laboratory is used for the latter. Pertinent field information is procured from expeditions which the QM partially supports. Current examples of these are: the University of California African Expedition, American Museum of Natural History Expedition to East Africa, Davis Expedition to French Guiana. Quartermaster officers are being trained for the research staff by graduate departments of geography and physiology.

A number of university departments of geography and physiology (such as those at Clark, Maryland, Catholic, Penn State, Harvard, Washington, Cornell, Pennsylvania and Indiana) are assisting this research under contract.

In this study of how best to protect man from environmental stresses, cooperation is necessary with many governmental and non-governmental agencies and institutions and with foreign research groups. The work is a prime example of geography applied to practical problems.

COL. CHARLES H. MASON—*The Rôle of the Geographer in Military Planning.*

Throughout history geography has been the basis of all calculations in war. The scale of warfare has expanded enormously from the days when opposing commanders could scan the entire battlefield, and the needs of armed forces were simple. Among these needs is current geographical information, which now must be available for the entire globe. The elaborate preparations required for modern warfare call for long-range planning, sometimes years in advance of probable need. This planning is based largely upon geography, every phase of which must be studied and interpreted in detail in the light of its military implication. This necessarily precedes manufacture of weapons and equipment and the training of men.

The preliminary work involves mapping, exploration, observation, research and precise geodetic computations, and it encompasses tides and currents, climate and weather, coasts and beaches, passes and obstacles, soils and trafficability, vegetation and cultural features. Now that the entire world is a potential theater, this information must be available for every portion of the globe.

At the present time there is a shortage of geographers in this country with adequate training to fulfill the geographical requirements of our exacting military planners. Costly weapons must not be wasted for want of completely reliable information on the areas over which they must be transported or used. It is the duty of American geographers, as responsible and specially qualified citizens, to apply their skill and training to the national defense by joining the Military Intelligence Reserve and an "Affiliated Unit," by requesting periods of active duty, by studying the terrain aspects of military history, by seeking government contracts for exploration and research, by encouraging training in geography, by introducing courses in military geography, and by utilizing press and radio to interpret the geopolitical and geographic aspects of the changing world situation.

PAUL A. SIPLE—*Application of Geographic Research to U. S. Army Needs.*

The United States Army had an awakening to the need of geographical research during World War II. Many agencies of the Army were looking for geographers and climatologists. Trained geographers were at a premium. Since the war, many geographers have remained with the Army in key research positions.

The fields wherein geographers have been active are (a) Research and Development, and (b) Intelligence. In the research field geographers apply geographic techniques to the analysis of environmental factors and their effect upon men, equipment, and operations. This approach is new. It involves the systematic study of geographic and climatic factors, their characteristics, effects, and control. Geographers are working in close unison with material designers, physiologists, and many others in various scientific disciplines. The geographer's rôle involves the determination of the location, duration, intensity and distribution of each type of environmental factor. Where the geographer is serving research and development, he is forced somewhat away from broad regional approaches, but the interplay of factors in a microform becomes highly emphasized. He therefore follows the well-accepted systematic study of individual geographic factors.

In the field of intelligence, studies are oriented into still broader geographical regional patterns. The geographer there assists the research and development worker by collecting environmental data from foreign areas as well as by showing strategic areas of fundamental importance.

Geographers are also active in guiding and instigating geographical exploration in search of environmental information in areas of difficult access. Within the past year, geographers have assisted with planning and carrying out several expeditions to little-known areas.

FRANK C. WHITMORE, JR.—*Military Geology.*[1]

Military geology is the application of the principles of geology to the solution of military problems. It is useful in the engineering phases of military operations: location of water supplies; siting and construction of airfields; routing, construction, and maintenance of military roads; and location of geologic construction materials. It is applied to the classification of terrain, for areas of similar terrain usually coincide closely with districts in which the lithology, geologic structure, and physiographic stage are essentially equal. It is used in the location of bombing targets, for knowledge of the economic geology of an area means knowledge of the probable location of mineral-processing plants and even of industrial areas. Geology, together with pedology and climatology, is applied to the determination of the suitability of ground for cross-country movement of foot troops and military vehicles. Such work was done by geologists both at the strategic and tactical levels during the recent war. In preparation of strategic reports on these subjects as they apply to enemy-occupied areas, geologists utilize geologic literature; geologic, topographic, and soils maps; and aerial photographs. Their most useful tool is their knowledge of geologic processes: unweathered rocks of given composition have the same properties the world over, and rocks weather to similar products in areas of similar climate.

Since the end of the war, the purposes of military geologic studies have changed somewhat. Office studies have been partly replaced by field studies, whose purpose is to solve specific problems such as location of construction materials to enlarge airfields in occupied areas, to develop geologic information in strategic areas where such information was lacking during the war, or to check the accuracy of strategic studies prepared during the war, with the purpose of revising methods or preparing future studies dealing with inaccessible areas.

Symposium: Geographic Research in the Quartermaster Corps, arranged by Hoyt Lemons

R. D. CAMPBELL—*Microclimatic Observations for Alaskan Mosquito Control Studies.*

Under the sponsorship of the Army Committee on Insect and Rodent Control, an Alaskan field study to determine methods of control of mosquitoes and other noxious insects was inaugurated in the summer of 1947. As one part of its contribution to the field program, the Office of the Quartermaster General was asked to make the observations of temperature, wind, humidity, and pressure necessary to the successful accomplishment of the program. Observations were coordinated with the work of the entomologists and botanists. With the exception of a potentiometer and thermocouples for recording temperature, standard instruments were used throughout.

Generally speaking the observations were, because of the reconnaissance nature of the initial field season, too brief and scattered to have great validity. In addition,

[1] Published by permission of the Director, U. S. Geological Survey. Thanks!

several further requirements were seen: (1) types of observations other than those anticipated, and refinements in some of the planned observations; (2) special instruments and methods of observation, called for both by the nature of the entomological studies and by the stresses and limitations of the field environment; and (3) additional personnel, if sufficient observations were to be obtained.

On the basis of the experiences of the first field season, a new, more detailed program of observations has been drawn up for the 1948 field season; this will be coordinated with the revised programs of the other technologists attached to the project, and it is hoped that the combined program will produce significant information concerning the ecology and control of noxious insects in Alaska.

ARNOLD COURT—*Analysis of Mean Daily Range of Temperature.*

Mean daily range of temperature, the most easily obtained and consequently most generally used index of the daily fluctuation of temperature, is compared with monthly values of the frequency distribution of hourly temperatures at selected stations in the United States. From this comparison, the significance of the mean daily range is determined in terms of temperatures to be anticipated, and applied to the problem of estimating the amount by which actual temperatures vary about the monthly mean.

DOUGLAS H. K. LEE—*The Integration of Physiological and Geographical Concepts in the Study of Environment.*

The environment cannot be studied apart from the thing to which it is environmental. In a very large proportion of cases this thing is man. What man is, what he does, how he reacts to environmental stress, his capacity for adjustment, cannot be appreciated without an understanding of his physiology. Physiological and geographical points of view, methods of study, and interpretations of observations must be reconciled in their mutual interest. In systematic education the disciplines of physiology and geography have been placed at a considerable distance from each other, so that common thought has been difficult and the opportunity for misconception great. This contribution discusses certain ideas of human function which have been used in the study of environmental effects upon man and which do not seem to be in accordance with modern physiological concepts, in the hope that a better integration will be effected in the future.

The relationship of skin pigmentation to the fate of incident radiant energy, the effect of radiation upon man, and some thoughts on the vexed question of the climatic significance of racial pigmentation are discussed, as is also the question of eye color.

The meaning of "metabolism" and the effect of climate upon it has often been misunderstood, with a consequent clouding of the picture.

Renal function is a very complex study upon which fresh enlightenment constantly falls. The evidence for climatic effects upon renal function is discussed in the light of current knowledge. The common idea that the skin is an excretory

organ is also examined, and the meaning of the conclusions for the understanding of stress physiology considered.

HUGH O'NEILL—*Vegetation and Environment in Alaska (With Special Reference to Mosquito Control).*

One of the most important environmental factors in Alaska adversely affecting man as well as his domesticated animals and game animals is the frequent outbreak in summer of vast numbers of bloodsucking insects, especially mosquitoes and blackflies (Simulium). In addition to the misery and torment they cause man and animals these insects carry virus diseases and parasites of game animals (e.g., malarial parasites of wild ducks), and exceptionally have been known to transmit malaria (as in northern Russia during the period of the first World War), although the parasites were unable to overwinter in the mosquito. Further, these insects constitute a problem not only in Alaska but in all but the most extreme Arctic lands and in much of the subarctic regions.

To deal with these circumpolar pests it is obviously necessary to attack them in their breeding places. Such places are best recognized by the vegetation associated with them, especially as such vegetation can be recognized on aerial photographs. Preliminary studies in the interior of Alaska indicate the possibility of doing this, as well as the possibility of interpreting to some extent the terrain, soils, and even climate, from studies of the vegetation.

ERWIN RAISZ—*Mapping Arctic Environments.*

The current medium- and small-scale maps of the Arctic with their 500- and 1000-foot contour intervals serve well for air navigation but they are not well adapted for differentiating the various Arctic environmental types. Reference is made to kodachromes showing such widely different regions as the rocky barrens, the forested muskeg lands, the pitted wheat lands, and the alluvial plain of the Point Barrow tundra, all dotted with lakes. Each has different origin, needs different equipment and clothing, different way of sustenance, yet on the available maps they look exactly alike.

The Environmental Protection Division of the Quartermaster Corps is now working on small-scale maps showing relief by landform symbols, and vegetation types by green patterns, and features like rock exposures, polygons, sand and gravel flats, etc., by brown symbols. The work is still in an experimental state. Maps 1 : 2,500,000 to 1 : 5,000,000 are planned to cover Alaska, Canada, and Greenland and Iceland, and if successful the program will be extended to other parts of the world. A sample map in colors of Southern Alaska was exhibited.

WILLIAM VAN ROYEN—*Quartermaster Geographic Research Conducted at the University of Maryland.*

During the recent war American troops had to live under highly diverse environmental conditions. Army equipment, shelter, and clothing provided by the Office of

the Quartermaster General often proved ill-adapted to conditions encountered. Thus the Office of the Quartermaster General has a vital interest in studying environmental conditions. While experiments in the laboratory are of great importance, studies of sample regions or actual problems are equally important. Three projects of the latter type are carried on by a staff of ten at the University of Maryland.

One project deals with environmental conditions in a part of western Africa which embraces part of the Sahara desert and part of the Sudanese Sahel. For purposes of comparison, supply and equipment experiences are investigated in the Egypt-Tripolitania-Libya area. Much of the literature of the area in French, German, English, and Italian is being investigated for pertinent facts, as well as those maps found to be basic. The bibliography at present includes well over 2,000 items. Sample checking of results in the field is planned.

A somewhat similar study is carried on for Arctic areas, and on the basis of the newest scientific literature available. A third project deals with certain phases of microclimatology applicable to certain practical problems of the Office of the Quartermaster General. An "Annotated Bibliography on Instrumentation and Methodology for Microclimatic Purposes" has just been completed. A second bibliography on microclimatic observations is in progress, as also work on an investigation as to whether conditions at various micro-levels may be derived from standard observations, given certain other known conditions.

REVIEWS AND ABSTRACTS OF STUDIES

ANALYSIS OF ESTONIAN POPULATION MOVEMENTS

Kant, Edg.: "Den Inre Onflyttningen I Estland i samband med de Estniska stadernas omland " (Internal Migration in Estonia, with special reference to the environs of its cities), *Svensk Geografisk Årsbok*, Årg. 22, 1946, pp. 83–124.

This interesting study of migratory movements within a country, more particularly rural-urban migrations, is especially noteworthy for its emphasis upon the danger of generalizing for all regions in terms of the experiences in one, and for its recognition of the futility in assigning a single reaction of man to one or two simple elements. In fact, the author actually discounts some of his own conclusions when he admits the presence of a vast array of variables to account for migrations, after he has sought a mathematical approach to the problem of rural-urban migration in Estonia.

Professor Kant questions the admissibility so far as Estonia is concerned of Howard Woolston's "law" which states that "cities attract population in proportion to their size." He shows that quite the contrary is the case in this former New Baltic State. It is conceivable that both Woolston and Kant are equally correct, the difference for their conclusions being found largely in (1) a nation in process of settlement, and (2) a region well established except for occasional disruptions due to war.

The period under consideration in Estonia extends from 1920 to 1940. Herein again may be found a radical difference between this study and Woolston's inasmuch as migration from urban to rural areas was encouraged by the Estonian Government after World War I, when many estates were confiscated and made available on easy terms in small parcels to all persons, but particularly to urban dwellers, who could show that they had had some experience in farming or some skill which could be readily adapted to farming.

Of the total migrants to urban centers 57.7 per cent have been rural and 42.3 per cent have come from other urban settlements. When these averages are broken down, it is found that the percentage range of those who have come from rural districts and those from urban is quite wide and seemingly related to regional habitats. The author concludes from this observation and certain previous studies, that his findings agree with those of DeVooys' for the Netherlands, namely, "that rural areas with the highest rate of immigration are not the regions of greatest birth surpluses."

Although Tallinn attracts migrants from all parts of Estonia, in all other cases migrants to the cities originate in near-by areas. In fact, there is a close correlation between the trade hinterland and the place of origin of urban immigrants. The number of rural-urban migrants is inversely proportional to their distance from the city. This observation has been worked out in great detail by Professor Kant for the city of Tartu. The Young formula $M = K \frac{F}{D^2}$ in a somewhat modified form, has been brought into play. In the formula, K is a constant, F the force of attraction, and D the distance. At best, even with Kant's modifications, the formula is empirical and subject to the usual weaknesses inherent in such expressions which attempt to measure human behavior with mathematical precision. Kant notes that such elements as wages, costs of transportation, other economic circumstances, general social and psychological factors, all play a part in the problem. Nevertheless, he sees virtue in his analyses. He believes they provide contributions to a better understanding of population movements. A map showing a zonal distribution of the intensity of the sphere of influence of Tartu with special reference to its source of supply of immigrants classified according to occupations, is essentially what one might expect. That expectation is corroborated by the statistical analysis.

Tables, maps, diagrams, with legends in both Swedish and English, contribute much to the lucidity of the paper. A selected bibliography including several papers by United States writers and a summary in English conclude this interesting presentation.

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REPORT ON THE SOUTHWEST OF ENGLAND

Devon and Cornwall: a Preliminary Survey. A report issued by the Survey Committee of the University College of the South West, Exeter. A. Wheaton and Company, Exeter, 1947. 318 pp.; 38 figs.; 13 maps.

To the reader whose concept of southwestern England has been acquired by close study of mystery stories and the famous Dartmoor prison, the volume at hand is most illuminating, for Dartmoor, Exmoor, and Bodmin Moor are only incidental parts of the geography of this section of Britain. About half the survey is devoted to a detailed description of the industry and trade of the two counties, including the delimitation of the shopping areas of principal towns and cities, the dominant service industries, and the bases of local industrial developments. Other sections cover the density and distribution of population, population trends and local population movements; and geology, minerals, climate, fisheries, and agriculture. There is much emphasis on tourism as a source of income to the permanent residents of the region. Each chapter stands by itself as a separate subject, and the different parts of the book lack coordination; they do not lead logically from one part of the discussion to the next. Some of the chapter titles are misleading. The chapter on geology, for example, includes a study of geomorphology and local scenery as a source of income. In spite of these shortcomings, the writing is so packed with information that the survey becomes encyclopedic, and in that way the book is a valuable contribution to the geography of Britain.

The first part of the survey is principally demographic in character, with analysis of census data. To Americans, the use of figures taken from a census of 1931 would be open to criticism except in a historical study, but the relatively slow rate of change in this corner of the island makes possible the effective use of data which seem out of date to us. Much of the population material could have been presented more efficiently in the form of graphs, although some pictographs have been used near the end of the volume, and the chapter on fisheries is liberally provided with graphs.

Despite the large amount of geographical information in the book, the reader is left with the feeling that there is more to the story; for example, there is no indication, either by map or by figures, of the comparative sizes of landholdings. Neither is there a discussion of that difficult economic problem of the presence of large landed estates and a landed aristocracy which retards the advance of agriculture and trade in Cornwall and Devon. The poor state of agricultural workers is indicated, but the causes assigned are inadequate transport facilities, unfavorable terrain for building new agricultural communities, distance from the coastal settlements, and similar considerations. Other problems are covered with reasonable objectivity; for example, the question whether to improve communications and thereby attract thousands of new tourists, or to make no improvements and cater to a very few exclusive but wealthy visitors.

This survey contains much material on changes brought about by the war, particularly in the industrial structure of the area. It was found as a result of the study that prewar trends were largely reversed, especially in Plymouth which suffered heavily from bombing. Before 1939, the trend of industry and trade had been directed seaward; after 1945, the interior settlements enjoyed an increase in industry and population, and the coastal towns whose income derived from the tourist trade were unable to regain their prewar popularity. Two sections cover the short-term and long-term views of what is believed will occur to industry in the future, and in this sense the survey verges on the field of planning. This reader has seen no detailed study of an American area in which postwar prospects were considered as fully as in this publication.

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A GEOGRAPHICAL INTELLIGENCE DOCUMENT

Atlas de l'Espagne. L'Attaché Militaire, Ambassade de France en Espagne. Deuxieme Bureau, Etat-Major de l'Armée. Paris, 1940. 20 maps; 6 pp.

On March 21, 1940, a secret Bordereau d'Envoi prepared by the Military Attaché to the French Embassy was forwarded by diplomatic pouch to the Ministre de la Défense Nationale de la Guerre de France. It was received by the Deuxieme Bureau, Etat-Major de l'Armée, on March 27, 1940. At this time the full might of German air power and mechanized ground

forces had not yet overwhelmed the Low Countries, and France still felt secure behind its vaunted Maginot Line. The "cold war" of 1940 was about to end. France was concerned about the military, economic, and political complexions of its neighbor to the south. The atlas under consideration is in part an outgrowth of France's attitude in 1940.

After processing and compilation by the Deuxieme Bureau, the original document was circulated among interested departments of the French Government. With the fall of France, the volume and several additional maps came into the possession of the German Government where it served its ultimate purposes. Shortly after the occupation of Berlin in 1945 an OSS Map Intelligence Team obtained the atlas from the German Foreign Office. With the demobilization of OSS the document was turned over to the Department of State and is now housed in the Map Library.

The introduction to the atlas reports that hunger was widespread in Spain in 1940 and the food crisis was becoming increasingly severe with each passing day. Such a condition was interpreted as militating against active participation in the war because it resulted in questionable loyalty on the part of the people and the Army toward the Franco government. Economic conditions were most unsatisfactory. Political opinions were divided. Great admiration for German military prowess was common, and little friendship was held for France. British support of Spain through the purchase of raw materials and a slackening of the blockade in favor of food imports was effective. American political actions were watched with interest.

Evaluation of the volume took into consideration (1) publishing authority, (2) compilation techniques, and (3) underlying motivation. The original intelligence was gathered by the French Military Attaché and was processed by one of the three or four leading intelligence agencies in the world. Adequate attention has been given to the evaluation of data and the compilation of maps. The underlying purpose of the work was to make available to the highest levels of the French Government an accurate and comprehensive evaluation of conditions cu. rent in Spain in 1940. The atlas may be considered reliable and authentic within the scale of the maps.

The maps were compiled on a uniform base, especially prepared by the Cartographic Service, Deuxieme Bureau, on January 1, 1940. Some characteristics appear to indicate that they were drafted from the Europe-Asia 1:4,000,000 set of the Directorate of Military Survey, Geographical Section, General Staff (British). Compilation and publishing scales are 1:4,000,000. Locational data are limited to the major drainage patterns and a scattering of towns and cities, but they are adequate for the purpose. Information of a military and non-military nature is more complete and up-to-date than can be found in commercial or governmental documents dealing with Spain.

The following list of maps serves as a table of contents for the main volume, which includes maps completed in the year 1940.

Map Number and Title	Date
1 Régements en divisionés	February 15
2 Régements non en divisionés	February 15
3 Ecoles	February 15
4 Bureaux de Recruitment et CM	February 21
5 Depôts et ateliers d'armement	March 21
6 Fabriques d'armes et explosifs, arsenaux, poudrières	March 25
7 (Missing)	
8 Aviation Militaire, Infrastreuture	February 15
9 Aviation Militaire, Plan de Bataille	February 28
10 Mèteos et radiophares	February 15
11 Aviation Militaire Postes radio	April 24
11a Aviation Militaire Postes radio	February 28
12 (Missing)	
13 Aviation Commerciale	March 13
14 Depôts essence, C.A.M.P.S.A.	February 15
15 Voies ferrées	February 20
16–1 Mines (charbon)	March 13
16–2 Mines (fer)	March 13
16–3 Mines (cuivre et pyrites de cuivre)	March 13
16–4 Mines (plomb-divers)	March 13
17 and 18 (Missing)	
19 Presse Espagnole	March 6 (revised to February 28, 1941)
20 Bateaux allemands en Espagne	March 13

The Addenda comprise maps completed in 1941 and 1942. These were drawn on varying scales as indicated in the table below:

Map Title	Scale	Date
Traveaux de Routes et Pistes as Maroc Espagnol, Zone Occidentale	1:500,000	June 12, 1941
Marine—Ordre de Bataille	1:4,000,000	Jan. 1, 1941
Stationnement des Troupes dans l'Enclave d'Ifni	1:500,000	Dec. 16, 1941
Croquis du dispositif des grandes units	1:2,600,000	Jan. 1, 1942
Stationnement des Troupes au Sahara Espagnol et aux Canaries	1:2,000,000	Dec. 16, 1941
Forces Navales Espagnoles —Stationnement	1:1,000,000	April 5, 1941
Defense Terreatre de la Côte Nord du Detroit de Gibraltar	1:64,500	No date
Stationnement des Troupes au Maroc Espagnol	1:500,000	Dec. 31, 1941
Stationnement des Forces Militaires Etrangers en Afrique Occidental et dans les Archipels	1:5,000,000	Sept. 1, 1941

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